The
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# Chairman of the Board

WHAT has been feared for some time past is now actually taking place. Sir Andrew Duncan, whose chairmanship of the Central Electricity Board during the past eight years has given such general satisfaction to the electrical industry, is resigning that office in order to become chairman of one of Britain's greatest industrial federations.

Our first duty is to tender congratulations to Sir Andrew and to the iron and steel industry, and our next to express regret that Sir Andrew's capacity for handling large affairs with judgment, tact and enterprise will no longer be the peculiar right of the electrical industry. His earlier activities made him master of other industries, notably the coal trade, and to his legal, financial, and big industrial qualifications there have now been added eight years of electricity production, distribution and organisation, thus combining in one man a unique knowledge both of great industries and of electricity which is destined to play so big a part in their operation.

It will be recalled that a mind schooled in large affairs, and able to take a long and sound view, was brought to bear upon electrical organisation at a very important stage in our national planning. During his period of influence the grid gradually came to fruition. He soon became a familiar and a very welcome figure at electrical functions, and his various utterances revealed a knowledge of conditions favourable and otherwise to electrical development.

During the past few years he and the members of the Central Board have seen well enough that if the original intentions of the electricity grid scheme were to be fulfilled, giving a cheapened and more widely spread supply of electricity for the use of industry and of the public, there must be some "gingering up" in places. Sir Andrew's influence was felt in many an area of supply, and he took a keen interest in the reorganisation of the Electrical Development Association. His resignation at this particular moment will be generally regretted, because the grid has now reached the serious commercial stage, and the withdrawal of his influence will be unfortunate.

We hopefully await confirmation of the report that Sir Andrew will continue with the Central Board as a member, for, whoever follows him in the chair, we shall still be able to count upon his wide knowledge of affairs, and especially of the Board's policy and intentions, being available when vital questions arise.

Just now when there are so many advisers expressing their views concerning the best plans for future control, organisation and conduct of the great electricity supply systems of Great Britain, one thing becomes more and more obvious. The industry as it stands to-day is one which can only be properly guided or redirected by those who have had intimate and prolonged experience of it—its complex ownership, its finance, its organisation, and its ultimate objective.

To write, however learnedly, upon revolutionary changes, upon nationalisation, upon socialisation, upon reorganisation, and so forth, may prove of little assistance in securing an economic supply of electricity for all if the views expressed are due to political inspiration or ambition, or have birth in a mind unduly obsessed with the elimination of private ownership as a means of reaching the ideal electrical system.

It requires more than a year or two of economic study of the industry, its statistics, its attainments and its potentialities to qualify even a statesman or a politician to take in hand an industry which embodies the specialised work of experts spread over fifty years and evolve a new and perfect scheme.

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**A Successor**

WHO is to succeed Sir Andrew? This question has been before the Minister of Transport for some days. Our own repeated inquiries have brought the reply that nothing has been settled. If protracted deliberation signifies that every possible channel is being explored to find a man of large affairs and in other ways of suitable type and equipment who will inspire confid-

ence throughout the electricity supply industry, the time is being well spent, for the matter is a very serious one, having regard to future developments. The complaint of the plain man that the existence of too many authorities confuses him is not unjustifiable, any more than is the wish of others that so important an event as the loss of Sir Andrew could be made the occasion for concentration of leadership and control.

**Six London Companies**

IT is many a long year since a number of the oldest London electricity supply companies first adopted a policy of joint generation. Looking back to-day it may seem a little remarkable that that co-operative policy has not been carried into other aspects of the business of these and other companies. To readers who have watched the numerous electrical and other consolidations of recent years, therefore, the registration notice of the Central London Electricity Distribution Committee (1934), Ltd., published on page 736 of this issue, will not occasion so much excitement as the big-type headings of the evening newspapers caused at the end of last week. Precisely what is involved in the scheme is not yet divulged, but that there is a scheme is, of course, true—the mere registration indicates that—and it is made plain in statements issued to shareholders of the Westminster and St. James' Companies by Lord Wargrave and Mr. C. P. Sparks, respectively, that negotiations are in progress for a very close relationship to be introduced between these and the Charing Cross, the Kensington and Knightsbridge, the Chelsea, and the Brompton and Kensington companies. All of these concerns are, of course, subject to the London Electricity (No. 2) Act, 1925, and are purchaseable by the London and Home Counties J.E.A. in 1971.

**Valuable Co-operation**

ACCORDING to the official letters circulated by these and the other companies concerned matters have not yet reached the stage where a definite statement regarding the negotiations for a merger can be made. Without anticipating the full details we may say that it is hardly necessary to indicate to electrical men that the closer these companies get together the more likely is there to be a progressive uniform policy which will operate in the interests of consumer and shareholder alike. The publicity strength of gas interests in the Metropolitan area is chiefly due to the fact that there are only a few gas companies, and in the main these are very large and are financially powerful. If the consolidation of electrical interests means better service to the public it will, we hope, also mean a greater measure of enterprising propaganda.

**From Birmingham to Bournemouth**

WE congratulate those who are responsible for the final alteration in the date of the National Electrical Convention upon having removed the difficulty to which reference was made in our leading article of last week, entitled "An Awkward Situation." The Convention authorities are naturally anxious to facilitate matters for exhibitors of domestic and other products who wish to take part in the displays at both Bournemouth and Birmingham, and everybody desires that the two events shall not clash. It remains the fact, however, that there are only a Saturday and a Sunday between the closing down at Birmingham and the assembling day at Bournemouth. The Fair dates are May 20th to 31st, and the Convention opens on June 3rd, continuing until the 8th. The preliminary programme is to be issued in January. With regard to the committee question, while we still hold that only good can ensue from the two committees adopting a policy of definite and active co-operation, especially at this early stage, we learn from Mr. Simpson, the Secretary, that arrangements have been made for the Convention to be run by an Executive Sub-Committee. The nominees thereon of the various associations interested are as follows:—*I.M.E.A.*: Mr. E. E. Hoadley, Mr. J. W. J. Townley, Alderman Longley, and Mr. G. Porter. *B.E.D.A.*: Mr. A. C. Cramb. *Power Companies*: Mr. A. de Turckheim. *Provincial E.S. Association*: Mr. J. C. Dalton. *London E.S. Association*: Mr. A. F. Harrison. *E.C.A.*: Mr. L. C. Penwill. Presumably this sub-committee is responsible to the I.M.E.A. Council.

**That Commutator**

ONE of the most telling arguments in favour of a.c. distribution in its early days was that the rugged induction motor had no commutator. This argument remains valid to-day for most industrial applications, but the retort then commonly made that the use of the a.c. machine did not permit of efficient speed regulation is not now true. The performance of some of the earlier a.c. commutator motors did not compare well with that of the better d.c. designs, and there may still linger a prejudice against their extensive use. But, as Mr. C. W. Olliver in his article in this issue shows, the modern rotor-fed shunt commutator machine has solved the problem of speed regulation with a.c. supplies. Another important aspect is that of power-factor correction.

**The Optimists**

CONSIDERING that not much more than one-third of the total power in industry is obtained from the public mains, and that a greater proportion than this is still non-electrical, an increase of only five per cent. in the kWh supplied for the purpose by authorised undertakings in the last two years (1930-32), for which official statistics are available, surely calls for some other explanation than "trade depression." On page 714 we show that only 105 undertakings sell more than ten million kWh apiece for motive power, and presumably some of this is in large blocks; yet sixteen manage to retain consumers in the teeth of private-plant competition with average prices of over 1d. per kWh. Of the smaller concerns, 136 charged over 1d. but not more than 1½d., 85 from 1½d. to 2d., and 125 from 2d. to 3d. About seventy undertakings indulged in the hope of building up a power load at over 3d. per kWh. It can't be done!

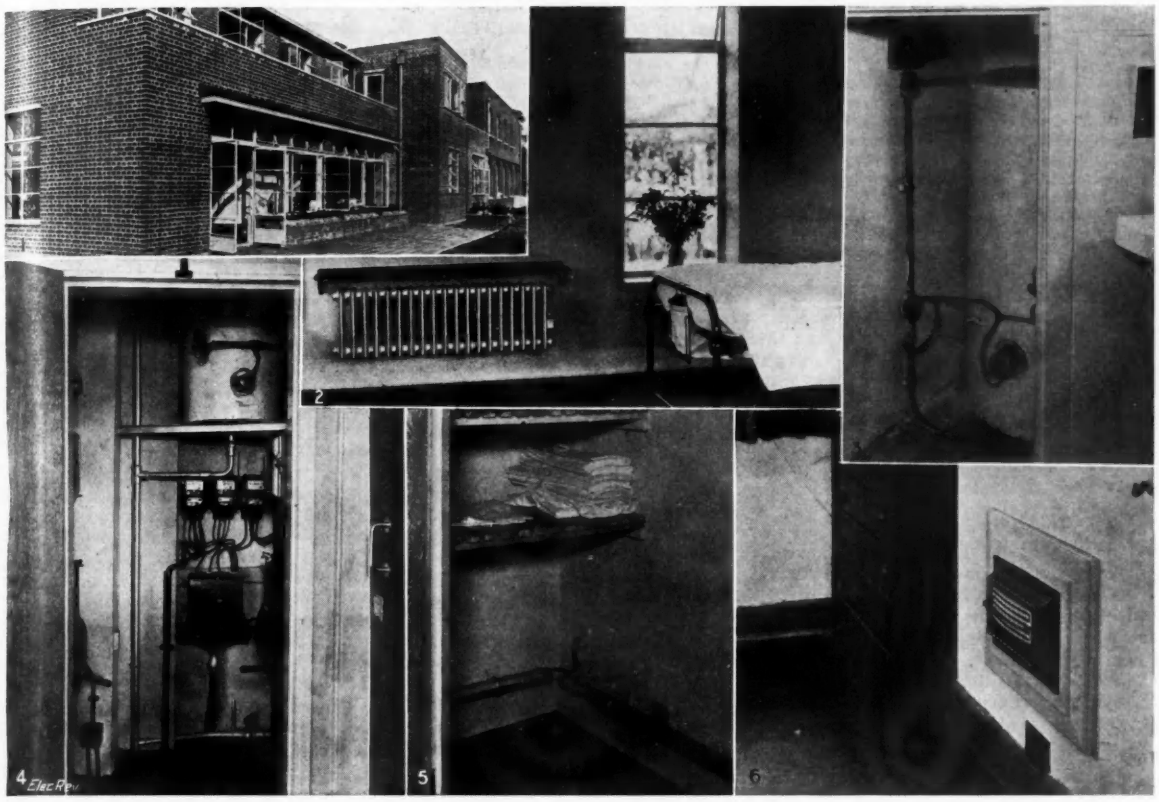
**Through the Kitchen Window**

A NOVEL way, adopted by an Ohio electrical utility, of getting a footing in the house of a possible client is reported in the *Electrical World*. A representative calls and offers two weeks' free electrical service, and if he secures consent arrangements are made to bring in a temporary service line through the kitchen window and install a number of appliances. If at the end of the trial period it is decided that the service is not wanted, the whole of the equipment is removed. In the first year, however, seventeen out of twenty trial installations induced the desire for a permanent service. It was also found that these new consumers ordered about twice the amount of equipment that was required by the usual newly wired house. This is a plan which might be adopted in rural districts in this country.

**Good Installation Work**

THE discussion that followed Mr. W. Lang's lecture before the Association of Supervising Electrical Engineers on Tuesday provided further evidence of the healthy interest that is being taken in the revised I.E.E. Regulations. The important suggestion was made by Mr. H. J. Cash that any demand for a compulsory national code should relate to a minimum standard and not to the I.E.E. Regulations as such. Mr. Lang, in his remarks on earthing (which also formed the subject of a paper read by Mr. F. Leyburn before the E.P.E.A. London Technical Group on the previous evening), purposely left ample scope for Mr. T. C. Gilbert's lecture next month. Mr. Gilbert has advocated earth-leakage protection in several articles in the ELECTRICAL REVIEW, and the merits of his proposals are now being recognised. Recently three British firms have developed leakage-traps of the requisite type.

# Two Recent Examples of Installation Work



**The Eltham and Mottingham Cottage Hospital** (See page 713). 1. General view of exterior. 2. A wall heater in one of the wards. 3. The water heater for the upper floor. 4. The ground floor water heater. 5. Tubular heaters in an airing cupboard. 6. One of the nurses' rooms.

**The Great Hall and restaurant of Grosvenor House, London, W.** Two general views and some of the ribbed-glass lighting fittings which have been installed (See page 713)

# Liability for Consumers' Installations

By J. W. Thomas, LL.B., B.Sc., A.M.I.E.E., Barrister-at-Law

*An action to recover damages for personal injuries sustained when using an electric kettle was successfully maintained on October 17th, by a Mr. and Mrs. Clifford against the Ilford Borough Council* (ELECTRICAL REVIEW, *October 26th*). *The kettle had been hired from, and installed by, the Council, and it was alleged that in April, 1932, when Mrs. Clifford was using it she received a severe shock which caused her great pain and suffering and also expense. The Council admitted liability and that there was a defect in the wiring. The only question therefore was that of damages, and after hearing evidence the jury awarded the plaintiffs the total sum of £402 12s. with costs.*

THIS case was an illustration of the circumstances in which damages may be awarded for injury received owing to a defective installation, and it has probably raised in the minds of supply engineers and contractors the general question of responsibility to consumers in respect of their installations.

The matter may be considered under two heads: The installation, and the appliances used in the installation. The person usually responsible for an electrical installation is the contractor (or the undertaking) who installed it. If a consumer sustains an injury in consequence of some defect in the installation it will be for the consumer, in order to establish liability, to prove that the defect was due to the negligence of the contractor. In cases of this kind, as in most claims for damages for injury, liability depends upon proof of negligence, which in law means failure to take that care which a reasonable person would take under the circumstances. As a general rule, the fact that a consumer without negligence on his part had received an injury from his electrical installation would be *prima facie* evidence that the installation was not safe and, in the absence of strong rebutting evidence, would be sufficient to establish negligence and, therefore, liability.

## The Commissioners' Regulations

There is, however, another factor to be taken into consideration. Installations must conform to the Electricity Supply Regulations framed by the Electricity Commissioners, and one of the most important of these stipulates that the installation shall be so constructed, installed and protected as to prevent danger so far as is reasonably practicable. Supply authorities are, in fact, relieved from their statutory obligation to give a supply to an installation that does not conform with this requirement.

Failure to conform with this provision would, therefore, in itself probably be sufficient to establish negligence upon which a consumer who had sustained an injury through no fault of his own could successfully rely in an action for damages. If, however, the consumer had himself tampered with the installation, and the injury had been sustained as a result, the contractor would be relieved from liability provided he could show that there had been no negligence on his part, or that the injury was not due to his negligence but to the consumer's interference.

The question is sometimes asked whether any liability would rest on the undertaking by reason of its officials having inspected and approved the installation before connecting it up and commencing the supply. It is very doubtful whether there would be any liability. The responsibility for making the installation safe rests primarily upon the contractor, and it is submitted that he would not be able to escape liability merely by showing that the installation had been passed by the supply authority.

. Whilst it is the duty of a supply authority to inspect an installation to ensure that when connected to the supply it will not interfere with supplies to other consumers, it does not warrant that the installation is safe. While also the authority has to make a test before connecting up, this is primarily to make sure that there is no electrical leakage; that an installation has satisfied the test is no guarantee that the work on the installation has been well done or that it is safe. If the supply authority had installed the installation it would be liable, subject to the above conditions, just as any other contractor would be.

## Defective Appliances

If a consumer received an injury by reason of the use of a defective electrical appliance liability (if any) would rest upon the person or persons who supplied it, and not upon the electricity authority unless it was the supplier. Undertakings in general have no power to interfere with apparatus used by a consumer unless it is calculated to interfere unduly or improperly with the efficient supply to any other body or person or to affect injuriously the use of electricity by the undertaking or by other persons. Thus it is not responsible for the safety of appliances which may be upon a consumer's premises unless those appliances belong to it.

If a consumer is injured when using a defective appliance his remedy, if any, is against the person who supplied it, or, under certain circumstances, the manufacturer who made it. In order to establish liability against a contractor the person injured would have to prove that the injury was sustained by reason of a defect in the appliance or of its unsuitability for the purpose for which it was supplied and that the contractor was negligent in supplying an appliance which was defective or unsuitable.

The general principle of law is that when goods are sold by a trader for a particular purpose of which he is aware and it is shown that the buyer relies upon the skill and judgment of the seller, the goods must be reasonably fit for the purpose for which they are intended. This is so whether the seller is a manufacturer or not, but there is no implied condition of quality or fitness if a specific article is sold under its patent or trade name.

The same principle, it is submitted, would apply even if the appliance was purchased from a shop or stores. If a person sells an article which is in such a condition that it is dangerous to handle owing to some defect which is not discoverable on inspection he renders himself liable to an action for damages if the purchaser sustains injury when using it. Though an electrical appliance may not be dangerous in itself, it may be a source of danger when connected up to an electrical supply.

## Third-party Liability

So far we have discussed the question of liability on the basis that the person injured is the consumer or purchaser whose relationship with the contractor or the supplier of the apparatus is one of contract. There was until recently some doubt as to whether there was a duty on the part of a seller of goods to take care so as to avoid injury to others who were not parties to the contract and yet who might use the goods.

The uncertainty was resolved in the case of M'Allister *v.* Stevenson which was before the House of Lords in 1932. It was decided in this case that the manufacturer of an article sold by him to a distributor in circumstances which prevent the distributor or the ultimate purchaser or consumer from discovering by inspection any defect in it is under a legal duty to the ultimate purchaser or consumer to take reasonable care that the article is free from defect likely to cause injury to health. Although this case was concerned with an article of food, it is submitted that the same principle would apply to an article for use which, when in use, might be likely to cause danger if defective.

The guiding principle was quoted from a former case: "Whenever one person supplies goods for the purpose of their being used by another person under such circumstances that everyone of ordinary sense would, if he thought, recognise at once that unless he used ordinary care and skill with regard to the condition of the thing supplied or the mode of supplying it there would be danger of injury to the person or property of him for whose use the thing is supplied and who is to use it, a duty arises to use ordinary care and skill as to the condition or manner of supplying such thing. And for a neglect of such ordinary care or skill, whereby injury happens, a legal liability arises to be enforced by an action for negligence."

If, however, a buyer has examined goods when purchasing there is no implied condition as regards defects which such examination ought to have revealed, and this is the case even if the examination is merely perfunctory.

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## The Electrodeposition of Rubber

RUBBER latex consists normally of a suspension of minute negatively charged rubber globules in an aqueous serum. Under electrolytic stress, therefore, the globules tend to migrate towards the anode. By using anodes of suitable metal, *e.g.*, zinc, or a porous diaphragm round the anode, it is possible to effect electrodeposition of the rubber; when using compounded latex, deposits are obtainable which can be dried and vulcanised. Commercial manufacturing processes have been based on this principle. In a paper published in the I.E.E. *Journal* Dr. D. F. Twiss shows how possible modifications in the conditions of electrodeposition permit numerous and interesting variations in the details of the procedure and of the results. The use of latex in this way obviates the customary need for the heavy machinery used in ordinary rubber manufacture and eliminates the preliminary milling treatment of the raw rubber, so that the mechanical properties of the product are correspondingly improved.

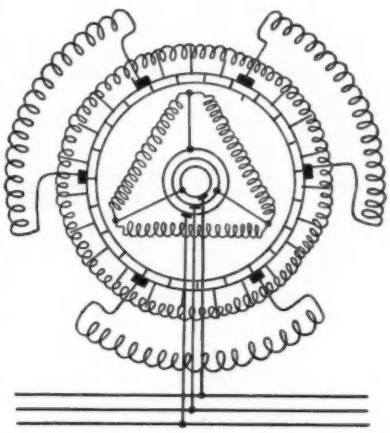
# A.C. Commutator Motors. By C. W. Olliver, B.A., B.Sc., E.S.E (Paris)

## Recent developments in technique and design

A NUMBER of years have elapsed since I gathered together the information then available on the a.c. commutator motor. During the intervening years these motors have been considerably developed, but further research on the theory of a.c. commutation has not brought to light sufficient new facts to warrant any additions to my previous writings on the subject.

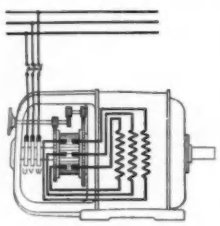
This article accordingly deals more particularly with the practical side of the question.

In generation and distribution a.c. has long held, and undoubtedly still holds, its own against d.c. From the point of view of utilisation, however, a.c. is not nearly so satisfactory, since the otherwise admirable induction motor is essentially a constant - speed machine. All of the many ways of obtaining speed regulation are uneconomical; the most uneconomical and the crudest is certainly speed regulation by resistances inserted in the rotor circuit.



**Windings of a typical shunt-wound commutator motor**

The possibilities of the a.c. commutator motor in this respect are very great. It can either be used alone, or in connection with induction motors, or as a variable-frequency speed-regulating device, especially where a large number of small motors are regulated simultaneously, as in the spinning industry.

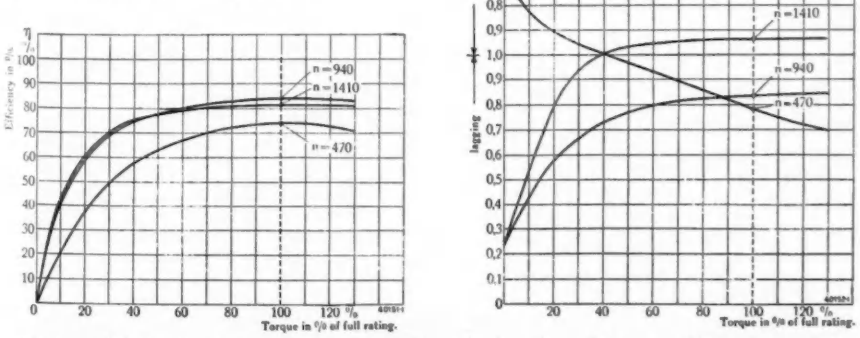


**Simplified diagram of a shunt-wound commutator motor**

Generally speaking, the commutator motor can be used alone for small and medium powers, say, up to 300 h.p., although machines of this type have been supplied up to 800 and even 1,000 h.p. For higher powers induction motors are more suitable, but here again speed regulation above and below synchronism can be conveniently and very economically obtained by cascading the induction motor with a commutator motor. The commutator motor, both by itself and when cascaded, gives complete speed regulation over a wide range with practically no loss.

### Series and Repulsion Motors

With an ordinary shunt or series d.c. motor the direction of rotation will remain the same if the direction of the applied e.m.f. is reversed, since the currents in the armature and field circuits both reverse. Provided the magnetic circuit is laminated, an ordinary series or shunt d.c. motor can therefore be operated on an alternating e.m.f.

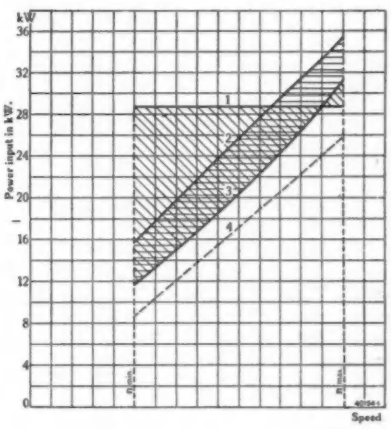



**At three different brush settings: Left, efficiency in function of torque. Right, power factor in function of torque (Brown, Boveri 26 kW, 1,410/470 r.p.m. shunt commutator motor)**

The various circuits of the motor can be connected to each other directly (in shunt or series) or inductively (by an auxiliary transformer) or by the transformer being the motor itself, which gives us the repulsion motor. It is the set of properties inherent in a.c. that gives the a.c. commutator motor a far greater variety of connections than are possessed by the d.c. motor. The fundamental difference between the a.c. and the d.c. motors is that in the latter voltage is absorbed by a counter-e.m.f. and by resistance, representing output and power loss; in the former we must take into account a new factor—inductance, so that the voltage absorbed, being wattless, will cause a lowering of the power factor. In the d.c. motor designers aim at a strong field, combined with a relatively weak armature, so as to reduce armature reaction as far as possible.

In the a.c. motor good power factor is essential. Good design will entail low self-inductance and the combination of a strong armature and a weak field; consequently some method must be devised to eliminate the effects of high armature reaction. It becomes necessary, then, to reduce the magnetic flux of armature reaction, or to increase the effective magnetic reluctance, and this is accomplished by various forms of compensation. Every commutator motor thus consists of a field winding, an armature winding, and a compensating winding. The arrangement of the different windings leads to a great number of different combinations, which explains the number of different types of these motors that have been designed and patented. Such is the fundamental principle of the commutator motor.

In addition to its adaptability to speed regulation, the commutator motor has a second extremely important advantage; by its very nature it is capable of providing its own excitation current. Excitation for the ordinary induction motor is provided by the mains, and consequently wattless current is drawn from the alternators, but the commutator motor, whether employed alone or in cascade with an induction motor, is self-exciting. It may even be run so as to feed back wattless energy to the mains while absorbing true watts, and thus can act as a power-factor compensator.




**Power consumption of different types of driving motors for a speed regulation range of 1:3**

1. Induction motor. 2. Ward-Leonard drive. 3. Schrage motor. 4. Output in kW

As a rule the three-phase commutator motor is only employed for drives requiring much speed regulation or very frequent starting, as only in such cases are their advantages fully utilised. These two points therefore characterise the type of drive for which they are most suitable, which include: Printing presses (rotary and flat), pulverised-fuel plant, pumps (centrifugal and ram), ring-spinning frames, rolling mills, mechanical stokers, sugar - refining machinery, travelling baking ovens, traction motors, large machine tools, calenders, calico-printing machines, cement kilns, compressors, blowers and fans, cranes, frequency changers, high - speed lifts, colliery winders and hoists, knitting machines, and paper-making machinery.

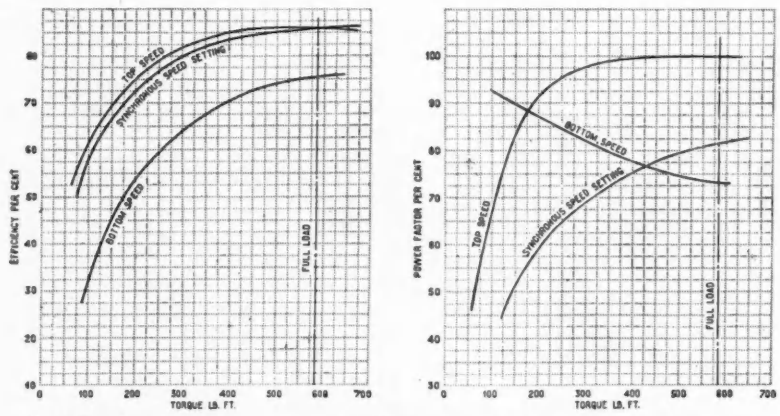
### Shunt Motor Applications

Series, shunt or compound characteristics can be obtained, but recent developments have favoured the use of the shunt commutator motor for general purposes. Some of the motors

have slip-rings in addition to the brush-gear; this depends on the arrangement of the various windings on the stator and rotor. D.c. technical practice has proved that in the majority of cases a shunt characteristic is preferred, if only to avoid the danger of the motor running away should the load be suddenly thrown off.

Schräge's invention, in 1910, of the rotor-fed shunt commutator motor enabled the speed of shunt machines to be regulated as easily by brush displacement as that of the motors with series characteristics. Since then these shunt commutator motors have become increasingly popular. They have dislodged the series motor from the position it held in certain industries and found new fields of application in other branches.

The three-phase shunt commutator motor has a certain basic similarity to the standard induction motor. The secondary winding, however, is on the stator, while the primary winding is on the rotor, being supplied through slip-rings from distribution network. There is an auxiliary winding, also lodged in the rotor, which is designed as a d.c. winding and which has a commutator. Two brush rockers, which can be mutually displaced, tap a polyphase adjustable voltage from the commutator which is led to the stator secondary winding, the latter being designed with open phases. If the two brushes of each phase are displaced away from each other a voltage is created between the corresponding brushes, which increases with the brush displacement and is imposed on the secondary winding. This gives rise to a change in the speed of the motor; according to the direction of brush displacement, the speed of the motor is either above or below synchronous speed.




**Left: Efficiency at varous speeds. Right: Power factor at various speeds (B.T.H. type C.H. 80/27 h.p., 720/240 r.p.m., 12-pole)**

## Speed Regulation

The control of speed by brush displacement has the great advantage of continuous regulation and eliminates accessory apparatus, as the commutator is the regulator. Theoretically, such motors can be built for any required range of speed, but in practice there are certain limitations. The greater number of motors are supplied with a range of regulation of one to two or one to three, and this is usually sufficient. Motors can be supplied, however, with a speed regulation as high as one to fifteen, as a normal product, but the price and weight increase rapidly as the range is widened. Further, the efficiency is lower, and the size of the commutator and the number of brushes correspondingly higher.

Various other factors affect the question. If the range of speed regulation is about one to three, then no starting resistances are required and the motor will start up smoothly; the wider the range the better the starting. Under such conditions starting torque is about double full-load torque and the starting current about 1.6 times full-load current. If, on the other hand, the range of speed regulation is narrow, starting resistances are necessary, but as these need only be dimensioned for the lower speed they are considerably smaller and cheaper than the ordinary starting resistances used with induction motors.

A very low speed range for occasional auxiliary duties can be attained by inserting resistances in the secondary winding, the motor being designed to give the range demanded by continuous service. The insertion of resistances, however, adversely affects the shunt characteristic, *i.e.*, the speed drop from no load to full load will be greater than for speed regulation by brush-shifting alone. Thus, if speed stability in the lower range is of great importance, it may be advantageous, with medium-size motors, to employ wider brush displacement ranges, such as one to eight.

Where a heavy starting torque and a steady creeping speed are required, *e.g.*, for large printing presses and super-calender drives, a barring gear driven by a small auxiliary motor is desirable. The drop in speed from no load to full load at any brush setting is from 2½ per cent. to 10 per cent. of the maximum speed, depending on the size of the motor and the speed range.

## Torque and Overloads

With a constant secondary current, such a motor exerts a constant torque throughout the entire speed range, *i.e.*, the output is directly proportional to the speed, and, as the majority of industrial applications require motors with this characteristic, the most economical size of machine can be used. Motors of this type can be designed to suit drives with other speed-torque characteristics, such as fans and pumps (where the torque is approximately proportional to the square of the speed) and constant h.p. drives such as machine tools. Constant speed can now be attained, despite irregularities in the frequency or big fluctuations in load, by automatic brush displacement by means of a quick-acting automatic regulator and a tachometer dynamo.

Heavy overloads can be carried over the whole range of speed regulation and more than double the rated torque developed for a short time in the lower speed-regulation range. Standard motors will carry 25 per cent. overload torque for two hours and 100 per cent. overload momentarily. They will also exert a starting torque of not less than 1½ times full-load torque with a line current of about 1½ times full-load current when the brushes are set at minimum speed.

For driving variable-speed fans and pumps constant-speed induction motors transmitting the load through variable-speed couplings are frequently used. These couplings are of two main types, the simpler and most popular consisting solely of a driving and driven member, coupled by means of fluid, usually oil, contained within the coupling. Since there are two members only, the torque due to the driving motor is balanced by the equal and opposite torque of the driven member. When used for speed variation the speed of the driven member is lower than that of the driver and the output is lower than the input, the difference, or slip power, being lost as heat. In a less common type of coupling a third member is introduced which enables a true speed transformation effect to be produced, but at the expense of extra losses.

With the rotor-fed motor commutation remains satisfactory over a wide range of speeds, a quality which is not shared by the older types of series or stator-fed motors. Generally speaking, commutation is perfect at synchronous speeds, but its quality falls off rapidly as the speed varies from synchronism. This is due mainly to a voltage induced by the rotating field across the commutator segments. This voltage in the stator-fed motor is proportional to the difference between the speed of the motor and synchronism. Since the commutation is worse the higher this voltage, the motor develops poor commutation at low or high speeds.

In order to obtain satisfactory commutation over a wide range of speeds this induced voltage must be kept low and, moreover, constant. This is the case with the rotor-fed motor, where the induced voltage is practically constant, because the rotating field which creates it is practically independent of the speed of the rotor and has not only a constant strength but even a constant relative speed of rotation as regards the commutator winding. Thus the commutation is as good at starting as at ordinary working speed. Consequently, the modern rotor-fed shunt commutator has practically solved the problem of a.c. commutation.

A recent and very important development is dissymmetrical brush displacement. This means that the two brush rockers are not displaced at the same speed towards or away from each other, so that the axis of the regulating winding on the rotor is displaced through a small angle with regard to the axis of the secondary winding on the stator, the displacement being greater the lower the speed.

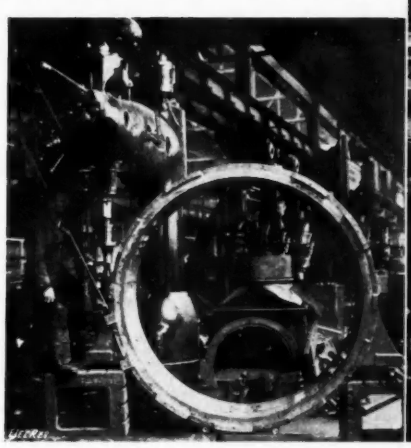
An improvement in the efficiency and power factor of the motor at low speeds results from this arrangement. Moreover, a dissymmetrical displacement decreases the full-load current not only in the primary but also in the secondary circuit, and this is very advantageous as regards temperature rise, particularly since at low speeds ventilation is necessarily poor. Finally, the starting torque is considerably increased by dissymmetrical brush displacement.

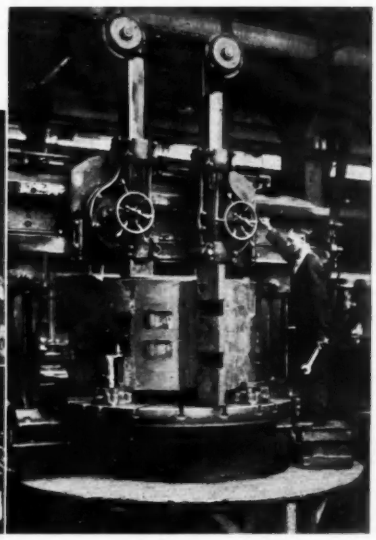
# Electrical Machinery Production

## Methods of manufacture at an up-to-date Scottish factory

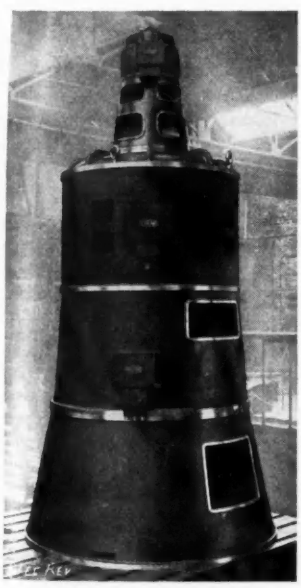
THE manufacture of a.c. and d.c. motors, generators and rotary convertors, switchgear and centrifugal pumps for dealing with every kind of medium is carried out on well-organised lines at the B.E.P. (British Electric Plant) works of the Harland Engineering Co., Ltd., Alloa, which we recently visited. The company is proud of its reputation for the accuracy and finish of its wood patterns. There is a modern foundry in which practically all the non-ferrous castings are made, and melting facilities are provided by three British oil-fired furnaces each of 3½ cwt. capacity and capable of melting five or six charges in eight hours.

**The steel magnet of a 1,500-kW convertor being drilled and tapped (left) and a fabricated stator (46 pieces of steel and 150 ft. of arc welding) on the boring mill**





While large quantities of iron and steel castings are employed we were much impressed by the extensive and successful use of fabrication, namely, the building-up of components from steel plates and sections cut to shape by oxygen flame and arc-welded. The company claims that this form of construction is much stronger than cast-iron, and consequently lighter than a casting of the same strength. Economy is also effected because, first, the fabrication of the actual article takes no longer than pattern-making for a casting; and secondly, there is much less machining to do and no risk of finding the job defective after machining as is sometimes the case with castings; finally, the lighter product costs less for transport. There is also no risk of breakage. Where, for example, only one item is required the cost of a finished article may be reduced by anything from 25 to 50 per cent., and its weight reduced in something like the same proportion, while the manufacturing time is reduced enormously.



**A 780-h.p. synchronous induction motor for Balsdean (Brighton) pumping station**

We saw 2-in. thick steel plate being cut by an oxygen flame at the rate of 6¾ in. per minute. A "cold" saw could not approach this rate, and even a band saw could not be used to cut many of the intricate shapes we saw produced.

A 780-h.p. synchronous induction motor for a borehole pump at the Balsdean pumping station of the Brighton Corporation was the most elaborate fabricated construction which we saw. The load suspended from the headgear was 30 tons. The heaviest individual pieces were the magnets for three 1,500-kW rotary convertors for the Glasgow Corporation Tramways Department. Each fabricated stator, made at the factory, is built up of about 46 pieces of steel, involving about 150 ft. of arc welding.

An interesting equipment under construction was a metal-clad switchboard equipped with oil circuit-breakers with welded tanks of the company's standard design. Expert welding is needed for these tanks, which have to withstand the sudden and high internal pressures of oil vapour as a result of breakers operating on short-circuit. To avoid oil leakage it is essential that the welding of the tanks shall be absolutely non-porous.

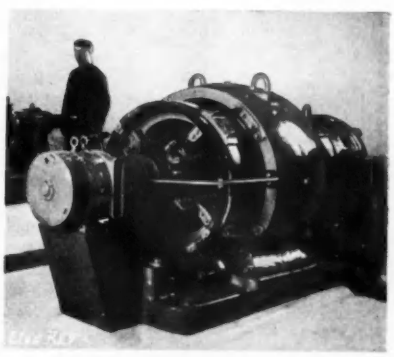
Metalclad switches and cubicle and flat-back switchboards were in course of manufacture, together with kiosks for housing some of the former. A point of special interest was an automatic reclosing relay to enable circuit-breakers in remote places to be reset and so obviate the necessity for sending an engineer to a sub-station where a circuit-breaker has opened, perhaps by the chance flick of a tree branch across the line. The device can be set to operate six times at adjustable speeds, and only if the fault persists after the sixth reset does the breaker remain out to await hand closing after the fault is cleared. If the fault clears in fewer than six automatic operations the device returns to zero for the next series of six operations.

One of the most successful of the Harland products is the sectional interlock drive for paper-making machines, which is now being applied to the drive of many other machines where definite speed relationship is required between two or more rotating or moving sections. To date, the horse power installed on Harland sectional drives at home and abroad is approaching 227,000.

The arc-welding generators used at Alloa are of the company's own manufacture, several of them being portable and driven by Harland a.c. motors. These motors, which have the special necessary characteristics, generate d.c. at 100/60 V, according to the length of arc and size of the electrode in use. The company manufactures motor-generators for arc-welding purposes for sale as a regular product.

The manufacture of stator, rotor and armature coreplates from the special quality of steel sheets necessary for these parts is carried out by a battery of circling, blanking and notching machines. A special boring and facing machine enables quick machining of the smaller sizes of stator frames. It bores out the frame for the laminated core and facing, and spigots both ends to take the end-frames simultaneously. The machining time for a stator such as we saw on the machine is about half an hour.

In the machine shop batteries of automatic and semi-automatic turret lathes, boring mills, milling and drilling machines of the latest types permit quick and accurate machining, while grinding machines finish all shafts to extremely fine limits. All parts produced on machines are subject to the most rigorous inspection and are checked by a department equipped not only with micrometer and vernier instruments, but with an elaborate outfit of special gauges set by certified measuring bars.



**A Harland arc-welding motor-generator set at the Whifflet foundry, Coatbridge**

In the winding department we watched a machine making diamond coils. A rectangular cotton-covered wire is attached to a clamp on a former which rotates horizontally to take the necessary turns in the form of a greatly elongated "O." The wire is cut, then one half of the former lifts and the other

falls. Clamps hold the straight sides firmly in position and the pins round which the coil is first wound move inwards, but hold the loops horizontally. This shapes the coil to enable it to drop into parallel slots the predetermined distance apart and with the end loops so twisted that every successive coil lies perfectly parallel to the first.

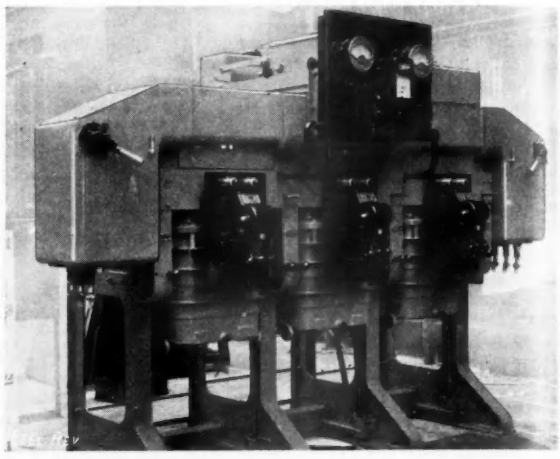
### The Haefely System

For insulating high-voltage windings the Haefely system is employed. With line voltages above, say, 4,000 there may be small discharges across air spaces inside the coils. These form nitric acid which destroys the insulation and eventually causes a burn out. The Haefely system prevents the presence of air spaces. The coils are immersed in molten compound at a sufficiently high temperature, and for long enough to drive out all air and vaporise any moisture, while the compound penetrates all interstices. Each coil is then put into a hot vice and pressed to shape to suit the slots, and the surplus compound is exuded, after which the vice jaws are cooled and the coil and compound sets into a solid mass.

A mica tube is formed on the slot portions in a special wrapping machine which irons sheet micafolium on to the coil with hot pads which melt the varnish in the micafolium and force out all the air between the layers together with all surplus varnish, so that the resultant mica tube becomes solid with the compounded coil. The compound is unaffected during the wrapping process, as its melting point is higher than that of the varnish. On cooling the varnish solidifies and the coil is ready for insertion into the slots.

Much care is taken in the construction of commutators. After machining internally and at the ends with grooves to receive the insulating vee rings of micanite, which are made on the premises with great accuracy and moulded on to the end clamps, the latter are put into place and drawn together by extra high tensile bolts. After mounting on their shafts they are run at a considerable overspeed in a heated chamber to season them and force out any surplus varnish in the micanite separators before being finally tightened, after which the brush surface is turned, ground and polished and the mica separators undercut.

The building in which the pump test tank is located was erected by the company itself. The steelwork is fabricated, and the total load on the roof trusses is roughly 15 tons, of which glass weighs about half. The building measures at present 100 ft. by 54 ft., but it will probably be enlarged soon to cope not only with the growing activities of the company but with the rapidly increasing size of plant manufactured. A



**An e.h.p. metalclad switchboard with fabricated oil circuit-breaker tanks**

pump for South Africa requiring 3,000 h.p. to drive it is being manufactured at present.

On the pump test bed we noticed what appeared to be a curious anomaly, namely, large motors driving small pumps, and *vice versa*. The reason for this is that a given frame size of centrifugal pump has an output where the quantity varies in direct proportion to the speed, while the head varies according to the square of the speed. Thus, doubling the speed involves increasing the power of the driving unit six times.

# Electricity on Board Ship. By A. Regnauld

## The position as reviewed in an I.E.E. paper

THE generation, distribution, and utilisation of electricity in merchant ships represent, to-day, a not inconsiderable part of the great electrical industry of this country. From the very nature of the case, electricity was obviously the most suitable form of illuminant for use on board ship, but the days have long since passed when a small lighting set represented the entire electrical equipment of a vessel.

Leaving out of consideration for the moment the possibilities of using electricity for the actual propulsion of the ship, it is gradually becoming recognised that for driving the various pumps, &c., in the engine room as well as for driving the deck machinery such as the capstan, windlass, steering gear and cargo winches, no superior or more economical source of power can be obtained than the electric motor. As a consequence, it is found that from the single reciprocating steam engine driven dynamo of 3-kW capacity, or even less, the electrical requirements of modern vessels have gradually increased until on the giant Cunard-White Star liner *Queen Mary* there will be no fewer than seven turbo-driven d.c. generators each of 1,300-kW capacity, four of which will be normally used for supplying current to the engine room auxiliaries and the deck machinery, the other three being required for dealing with the "hotel" load.

In the same way, the use of electricity for propulsion purposes has also extended very rapidly until to-day it includes almost every size and type of vessel. From the earliest examples, the *Electric Arc*, built on the Clyde in 1911 and having a single generator driven by an oil engine of 45 h.p., and the *Tynemount*, built on the Tyne in 1912 and fitted with two generator sets each driven by a 300-h.p. Diesel engine, installations have rapidly increased both in size and number, culminating in the French liner *Normandie*, now approaching completion at St. Nazaire—a vessel comparable in size with the *Queen Mary*—which is to be driven by quadruple screws, power for which will be provided by four 33,400-kW turbo-alternators.

I have deemed it necessary to give this very brief survey in order to indicate how comprehensive the subject of the "generation, distribution, and use of electricity on board ship" has become, and to suggest that it is quite impossible to deal with it in the scope of a single paper. Yet this is what Messrs. Wallace Saunders, Wilson & Jakeman have attempted to do in the paper which was read before the Institution of Electrical Engineers yesterday (Thursday) evening. The result is that they have given us a brief survey of what has been done and what is being done in this vast field, but in the time and space at their disposal that survey is, of necessity, very incomplete.

For this I am not blaming the authors as they have undoubtedly done their work very well. They have succeeded in giving within the compass of a not too lengthy paper an adequate idea of the peculiar problems which have faced the designers and manufacturers of electrical equipment for marine purposes and of the methods whereby these problems have been solved, but it could be wished that they had confined their attention to some particular phase of the marine field such as deck machinery, engine room auxiliaries, propulsion, hotel requirements, communication or protection, any one of which might well form the subject of a complete paper.

How extensive is the field which they have attempted to cover will be gathered from the fact that within the compass of eighteen pages of the "Proceedings" they have given us first of all a general survey of the uses to which electricity is put on board ship; this is followed by a section dealing with the generation of electricity for all services other than propulsion; another section deals with the distribution and use of the electrical energy covering switchboards, cables, motors, and their control gear; and finally there is a section on electric propulsion.

In every one of these sections, although the progress made in recent years has been almost phenomenal, we are very far from having reached finality, and there are many urgent problems clamouring for solution. Not the least important of these is the means to be adopted for driving the generators. No hard and fast rules can, of course, be laid down owing to the very diverse conditions under which different ships operate, but it is rather surprising to find, as the authors point out, that on some steam-turbine driven vessels, the Diesel engine is used for driving the auxiliary generators, while on motor ships, steam engine driven auxiliary generators are used, the steam being obtained from waste heat boilers using the main engine exhaust.

The ideal to which many American engineers have drawn attention is represented by what has been termed the power station principle in which a number of generators—the use of many small high-speed Diesel engines has been investigated in this connection—are connected to bus-bars from which all circuits, whether propulsion, auxiliary power, lighting, &c., are energised. I would have liked to have seen the possibilities of this principle discussed by the authors.

Another problem which merits careful investigation, but is dismissed in a sentence by the authors, is the use of alternating instead of direct current for auxiliary purposes. It is rather significant that even on the largest electrically propelled vessels, where for obvious reasons a.c. is employed in the propulsion circuits, d.c. is generated by smaller units for all other purposes throughout the ships. There is much to be said in favour of using a.c. motors, and Mr. W. J. Belsey, in a paper which he communicated early this year to the Institution of Marine Engineers, has estimated that not only could the inherent difficulty of using constant-speed squirrel-cage induction motors be surmounted but also that in the case of large passenger liners a saving in capital cost of 12.5 per cent. could be effected.

The problem of the design of controller equipment for the motors is also one upon which very much still remains to be done. This applies particularly to the starters and controllers for the motors driving deck machinery which are not only subjected to extreme variations of atmospheric temperature and humidity, but are often operated by unskilled men. I should have liked to have seen some reference in the paper to the steps which are being taken to solve what every marine superintendent knows is a very real problem.

For engine-room auxiliaries, this problem is not so urgent, for not only are the conditions under which both motor and control gear work more uniform, but the men in charge are generally skilled. Moreover, control equipment of the highest quality can be installed without undue increase in capital cost by the adoption of one or other of the plural starting systems which are now available in which one set of control gear is made to serve a number of different machines. This system, unfortunately, can hardly be adapted to deck machinery.

### The Cable Problem

The question of electric cables for use on board ship is dismissed in a few lines. This is very greatly to be regretted because the recent series of very serious fires which have occurred on passenger liners, fires often leading to heavy loss of life, has resulted in the electric wiring becoming the subject of suspicion. Whether the cause of the fire is to be found in an electrical fault or not, it is certain that once subjected to the action of heat, the insulation may be responsible for the spreading of the conflagration.

Cable manufacturers are endeavouring to meet this difficulty by the development of non-inflammable insulating material, but while this is a step in the right direction, it is also essential that the insulation and the protection should be such that there is no risk of breakdown due to the very onerous conditions to which the cable is subjected on shipboard. The authors evidently recognise this when they state that "the cables are the only link about which there may be doubts as to whether it will stand up to the demands made during the twenty-five years' service which is expected of the ship and all the gear in it."

Space will not permit of more than a cursory reference to the final section of the paper dealing with electric propulsion. The authors have given there a complete description of a typical turbo-electric drive using a.c. with details of the control gear showing how the manœuvring of the vessel is effected. This is the system which finds almost universal favour for the propulsion of large passenger liners. Where smaller powers are required the Diesel-electric system with d.c. generators and motors is preferred.

It is difficult to assess the relative merits of these two systems, particularly as on the majority of large passenger liners oil is used for steam raising purposes. There is, of course, a limit to the current which can be carried by the commutators, &c., where the d.c. system is employed, and in this connection the possibility of using Diesel engines with a.c. generators and synchronous motors merits attention, while the use of high-voltage d.c. might be worthy of investigation. I have already referred to the use of a number of small high-speed Diesel driven generators in this connection.

### Marine Engineers and Electricians

There is one last thought suggested by a careful study of this paper to which I think attention should be drawn. The authors rightly state that it has taken a long time to establish the use of electricity on board ship and that this has only been achieved by the use of the best workmanship and material, by the thorough manner in which electrical designers have tackled the problems involved, and by the co-operation of the marine engineers. But we would seriously question whether the correct procedure is being adopted to ensure that the electrical machinery receives the skilled attention which is essential to its correct operation and maintenance.

The status of the "electrician" on board ship is but little superior to that of a junior engineer, and except in an electrically propelled vessel the electricians are responsible for all the electrical equipment. On the other hand, where electrical propelling machinery is installed, the requirements of the Board of Trade are such that the skilled electrical engineer who has served his time with a firm of electrical manufacturers and has received a technical education in electrical subjects, has but little chance of being placed in charge of the engine room.

The work of the marine engineer is at all times onerous to a degree, but it is very necessary that the men who are placed in charge of the electrical machinery should not merely be thoroughly qualified for their job, but also encouraged to give of their best by the hope of future preferment.

This is one of the many problems which the authors have not dealt with, but as I have suggested, the subject of electricity on board ship has now become far too big to be dealt with in the scope of a single paper. Nevertheless, I recommend this survey to those who are desirous of obtaining a good idea of the present position of electricity in the marine engineering industry.

## The Great Hall at Grosvenor House

FORMER patrons of the ice skating rink at Grosvenor House, Park Lane, will hardly recognise it since its conversion into a dance hall and banqueting room. The Great Hall, as it is now termed, has a dancing floor area of 15,000 sq. ft., while by bringing into use the wide balcony promenade it is possible to entertain 2,000 guests at banquets and similar social functions. Service facilities have been brought up to date and the ventilating system modernised, while a new "golden" tubular lighting installation does not interfere with the view of the dance floor from the balconies.

The fittings illustrated on page 707 were manufactured by Tubelight Sales, Ltd., 23, Panton Street, S.W.1, to special designs and instructions given by the Grosvenor House authorities, and, as the illustrations show clearly, effective use has been made of ribbed-glass tubing. The fittings in the ballroom are composed of 30 and 40 mm. tube lamps. The chandelier metal work is of polished brass, lacquered, with cylinders of 1-in. diameter ribbed tubing varying from clear white to pale, medium, and dark amber. The terminals and base ball are of polished brass.

Wall brackets round the ballroom balcony are also of polished brass with amber ribbed tubing and crystal ball terminal, and similar materials are used for a 5-ft. long wall bracket. A newel post fitting at the base of the staircase is of polished brass, lacquered, with 1-in. square crystal cut glass blocks 12 in. high and a star-shaped head also made up of crystal blocks.

The restaurant dome fitting is of polished brass with a wood outer surround, the source of illumination being concealed within the brass ball. The restaurant chandelier metal work is of polished matt nickel with vertical arms of vari-coloured ribbed-glass tubing 1 in. diameter of clear white, silvered white, pink, and amber shades. The base terminal is a crystal cut glass ball 3.5 in. in diameter and the shades are of pleated silk. The lamps in the restaurant fittings are of the ordinary pear-shaped pattern.

### The Eltham and Mottingham Hospital

AN extension to the Eltham and Mottingham Cottage Hospital has recently been completed and photographs of the building are reproduced on p. 707. The new Mills Ward contains nine beds, an isolation bed and accommodation for five nurses. Space heating and water heating are performed electrically. The lighting fittings were supplied by Messrs. Troughton & Young, Ltd., and the space heating installation by Messrs. Benham & Sons, Ltd., who also supplied elements and thermostats to the Woolwich Borough Council for the water heaters. For heating the wards five 2½-kW "Electrovex" hospital-type radiators are fixed to the walls. In the corridors the fixed heaters are of the tubular type, loaded as follows: 7 ft., 420 W; 5 ft., 300 W; 4 ft., 240 W; 3 ft., 180 W. Control is by room-type thermostats. The tariff under which supplies are afforded for space and water heating is £4 per kW per annum on 25 per cent. of the total kilowatts installed plus ½d. per kWh. The kW charge is omitted for the two summer quarters.

# Industrial Power Tariffs

## Are high prices the cause of unsatisfactory progress?

OF the 660 authorised undertakings included in the latest volumes of Engineering and Financial Statistics (1931-1932) issued by the Electricity Commission, 106 (16 per cent. of the total) supplied more than 88 per cent. of the electricity sold for motive power, which reached 5,435.5 million kWh. This group includes all those undertakings (except the Lochaber Power Co.) with an output of more than ten million kWh per annum for industrial uses.

The overall average revenue obtained was 0.76d. per kWh and forty undertakings, the outputs and average prices of which are given in Table 1, fell below that figure. Above the ten million kWh point there is no very marked relationship between quantity sold and charges for energy. Nearly a hundred small undertakings make no returns under the heading of industrial power and so presumably do not differentiate between industrial and domestic uses.

TABLE I.—FORTY UNDERTAKINGS WITH PRICES BELOW THE AVERAGE

| | kWh. Sold (Millions) | Average Price (Pence) | | kWh. Sold (Millions) | Average Price (Pence) |
|---|---|---|---|---|---|
| Kent Electric Power Co. | 91 | 0.44 | Sheffield Corp. | 113 | 0.68 |
| North Wales Power Co. | 64 | 0.46 | Rochdale Corp. | 55 | 0.68 |
| Darlington Corp. | 17 | 0.53 | Edinburgh Corp. | 53 | 0.68 |
| Wallasey Corp. | 12 | 0.53 | St. Helens Corp. | 31 | 0.68 |
| North-Eastern Elec. Supply Co. | 491 | 0.54 | Salford Corp. | 39 | 0.69 |
| Stalybridge, &c., Electricity Board | 33 | 0.56 | Wessex Electricity Co. | 15 | 0.69 |
| Mersey Power Co. | 55 | 0.58 | Accrington Corp. | 12 | 0.69 |
| Stretford & District Electricity Board | 59 | 0.60 | Stoke-on-Trent Corp. | 29 | 0.70 |
| Rotherham Corp. | 65 | 0.60 | Newport Corp. | 20 | 0.71 |
| Oldham Corp. | 35 | 0.61 | Cardiff Corp. | 16 | 0.71 |
| South Wales Electric Power Co. | 56 | 0.61 | Maidstone Corp. | 17 | 0.71 |
| Barrow-in-Furness Corp. | 15 | 0.62 | Swansea Corp. | 22 | 0.72 |
| Liverpool Corp. | 114 | 0.64 | York Corp. | 21 | 0.72 |
| Lancaster Corp. | 11 | 0.66 | Yorks. Electric Power Co. | 129 | 0.73 |
| Bedford Corp. | 16 | 0.66 | Lincoln Corp. | 14 | 0.73 |
| Lancashire Electric Power Co. | 101 | 0.66 | Watford Corp. | 16 | 0.73 |
| Hull Corp. | 78 | 0.67 | Fulham M.B.C. | 10 | 0.74 |
| Derby & Notts. Elec. Power Co. | 75 | 0.67 | Luton Corp. | 24 | 0.74 |
| Coventry Corp. | 79 | 0.67 | West Ham Corp. | 50 | 0.74 |
| Wolverhampton Corp. | 57 | 0.67 | West Gloucestershire Power Co. | 18 | 0.74 |

TABLE 2.—POWER IN USE IN INDUSTRIAL GROUPS IN 1924 AND 1930

| Trade and/or Industry | | Power applied mechanically. | | Electric motors supplied from private plant. | | Electric motors driven by purchased electricity. | |
|---|---|---|---|---|---|---|---|
| | | Horse-power (thousands) | Percentage of total | Horse-power (thousands) | Percentage of total | Horse-power (thousands) | Percentage of total |
| Chemicals | 1924 | 131.2 | 37.3 | 87.8 | 25.0 | 132.7 | 37.7 |
| | 1930 | 125.6 | 24.2 | 169.3 | 32.7 | 223.1 | 43.1 |
| Iron and Steel | 1924 | 1,273.7 | 53.3 | 497.2 | 20.8 | 618.6 | 25.9 |
| | 1930 | 1,203.1 | 45.4 | 635.6 | 24.0 | 811.4 | 30.6 |
| Engineering and Shipbuilding | 1924 | 117.7 | 9.9 | 219.9 | 18.5 | 849.5 | 71.6 |
| | 1930 | 61.6 | 4.3 | 226.3 | 16.0 | 1,131.7 | 79.7 |
| Vehicles | 1924 | 18.3 | 8.0 | 45.1 | 19.7 | 165.4 | 72.3 |
| | 1930 | 17.0 | 5.2 | 50.1 | 15.3 | 260.7 | 79.5 |
| Textiles | 1924 | 1,704.7 | 73.6 | 250.7 | 10.8 | 361.9 | 15.6 |
| | 1930 | 1,419.7 | 61.6 | 341.8 | 14.8 | 544.5 | 23.6 |
| Food, Drink and Tobacco | 1924 | 170.8 | 33.4 | 85.9 | 16.8 | 255.1 | 49.8 |
| | 1930 | 129.5 | 20.5 | 131.3 | 20.8 | 371.5 | 58.7 |
| Paper, Printing and Stationery | 1924 | 148.8 | 36.0 | 101.9 | 24.6 | 162.8 | 39.4 |
| | 1930 | 120.1 | 17.8 | 298.0 | 44.1 | 258.0 | 38.1 |
| Other Trades | 1924 | 424.0 | 36.3 | 235.2 | 20.1 | 509.0 | 43.6 |
| | 1930 | 328.3 | 21.6 | 334.7 | 22.0 | 858.4 | 56.4 |
| Mines and Quarries | 1924 | 2,068.8 | 57.9 | 1,044.5 | 29.2 | 462.5 | 12.9 |
| | 1930 | 1,919.0 | 51.6 | 1,251.5 | 33.7 | 545.0 | 14.7 |
| Building and Contracting | 1924 | 71.5 | 46.5 | 4.8 | 3.1 | 77.4 | 50.4 |
| | 1930 | 67.1 | 39.6 | 2.9 | 1.7 | 99.5 | 58.7 |
| Totals | 1924 | 6,129.5 | 49.9 | 2,573.0 | 20.9 | 3,594.9 | 29.2 |
| | 1930 | 5,391.0 | 38.7 | 3,441.5 | 24.7 | 5,103.8 | 36.6 |

How far are unsuitable tariffs responsible for the slow rate of progress made in securing the power load compared with the much more lively developments in the domestic field? That it cannot be due to saturation is clear from Table 2, in which the trades of the country are divided into ten groups, from which public utility undertakings have been excluded; the h.p. stated in each case is that ordinarily in use in 1924 and 1930 as given in the Census of Production reports.

The mechanically driven horse-power declined by about one-eighth in the six years—not a great amount considering the large number of reciprocating engines in use. More than that amount was picked up by private plants, which have been most successful in the paper, printing and stationery trades, where the proportion of the motor horse-power supplied by purchased energy decreased. On the other hand private plant showed a proportional decline in the engineering and shipbuilding, vehicle, and building and contracting industries. The broad conclusion to be drawn from the data here given is that the tariffs and negotiating experience available do not meet the ambitions of the supply industry.

# Summer Thunderstorms

THE third annual report on the survey of thunderstorms in the British Isles contains a portion of the results obtained during the summer of 1933 and a supplement to the report of 1932, with a series of black and white and two-colour storm maps. Much further data in manuscript form is available for special work on application to Mr. S. Morris Bower, Langley Terrace, Oakes, Huddersfield.

Some of the experimental maps suggest an underlying rhythm in the movement of storm fronts, but further observations are needed to prove the reality of the apparent order. The quarterly maps suggest that the summer of 1932 was less stormy than that of the previous year in England, but more disturbed in Scotland and Ireland. The chain of stormy areas running north-east from central Ireland to Scotland is similar in form and orientation to the chain which sometimes appears between the Isle of Wight and Norfolk, and suggests that storm travel in Scotland may not be unlike that which obtains in England. A notable absentee was the usual slight storminess in Devon and Cornwall, while East Anglia did not experience the large amount of thunder with which it is commonly associated.

In 1933 thunder or lightning occurred somewhere in the British Isles on 103 days out of 183 in the six summer months, April to September. This total was 12 days less than the corresponding figure for 1932, and 7 days less than in 1931. In England a smaller number of days was recorded than in either 1931 or 1932, but the total for Wales was higher than in either of the two previous summers.

There is a suggestion of regularity in the totals for England, but the figures for Scotland and Ireland continue to indicate marked differences between the years. Though May appears to be the month of greatest thunderstorm frequency, the individual "storm-day areas" of June, July, and August are distinctly larger.

Mr. S. T. E. Dark contributes a report on trees struck by lightning, giving a total of 55 in 1933 against 15 in 1932. There are no cases of beech, birch, horse-chestnut, or holly in his list, but the number of elms struck is extraordinary as this tree is not usually regarded as dangerous. Photographs illustrate the spiral character of some of the strokes.

Details of objects damaged by lightning strokes are included. During the summer of 1933 about twenty cases of ball lightning were reported.

Dr. C. V. Boys contributes a short description of how the progress of a lightning discharge is revealed by the camera with rotating lenses which he has devised.

# Some New 66-kV Switchgear

THE selection of 66-kV as a distributing voltage in London, where space is limited and sites are valuable, has provided the incentive to develop more compact and less expensive forms of metalclad oil-filled switchgear than the designs which have hitherto prevailed for lower voltages.

For instance, the three feeder and three transformer units installed by the British Thomson-Houston Co., Ltd., in the Carnaby Street sub-station of the London Power Co. are conventional in so far as general metalclad practice is concerned, but unusual in two other important respects. First, the isolation of the breaker is accomplished by mechanically operated oil-immersed isolating switches, and, secondly, the breaker moving contacts are raised vertically upwards to open, two separate tanks being provided for each phase.

Each equipment comprises three main assemblies, one of which is the three-phase busbar isolator chamber from which three busbars are suspended; the second is the cable isolator chamber which carries the current transformer chambers and cable sealing ends; and the third is the three-phase oil circuit-breaker. The isolator chambers are supported by pedestals and the breaker fits into six spout openings at the top of the chambers, the top plates of which form a floor. Extensions at each side provide operating platforms which carry the breaker and isolator operating pedestals and the oil conservators.

The busbars are copper tube, synthetic bonded bakelised paper insulated, with buried copper ground band and protected against mechanical damage by tinned copper binding wire soldered to form a continuous external sheath. Condenser layers control the potential gradient at the ends where each length of bus enters a junction box for the branch connection to the circuit. They are oil filled, have conservator tanks and expansion joints, and each busbar and its junction box is separate, for phase isolation, which is preserved throughout.

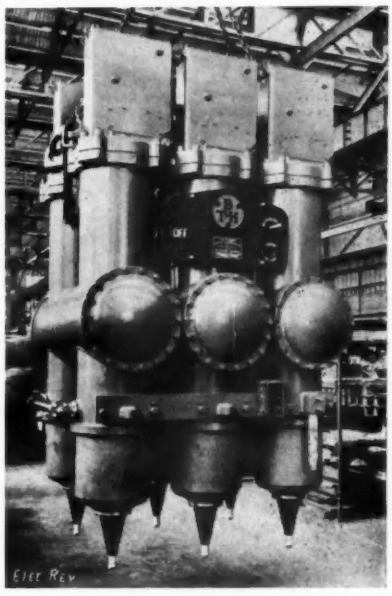
## Busbar and Cable Isolators

The busbar and cable oil-immersed isolators and earthing switches are similar in design and are housed in a chamber with internal partitions to preserve phase isolation. The contact blades are extended beyond the hinges and connected to special bakelised paper insulated operating rods coupled through tension rods to a way shaft with bearing pillars mounted on the top of the chamber. Testing is accomplished by inserting three testing bushings into spout openings on the top of the cable isolating switch chamber.

The new breaker is an evolution of type "H." A three-phase unit comprises six circular containers arranged in three pairs with a horizontal circular chamber joining each two pairs. In the base of each container is a condenser bushing with its lower terminal dipping into the isolator chamber and engaging with pressure line contacts. The upper end of the bushing supports an explosion chamber of the oil-blast type. Contact between the explosion chambers on each pole is made by rods engaging with stationary segmental contacts through which the rods slide. The segmental contacts in each pole are carried at the ends of a condenser bushing mounted in the horizontal chamber joining the two containers.

An upward movement of the contact rods opens the breaker and an independent way shaft is provided for the tension rods on the busbar and circuit side, so that in the unlikely event of the fracture of a rod the breaker will not be closed. The sliding segmental contact is of novel construction in that it is arranged for pressure point contact with the contact rod, the contacting surfaces being solid silver under a pressure of 50 lb. per segment.

The cylindrical containers are lined with concentrically spaced insulating tubes, the dielectric strength of the insulation assembly corresponding to that of the free oil path in a conventional tank. The condenser bushing at the base and also the horizontal bushings carrying the cross-over connections are each protected by a corrugated porcelain shell having a long leakage path which is not subject to deterioration in the event of carbon precipitation or sludge deposits forming as the result of circuit interruption.



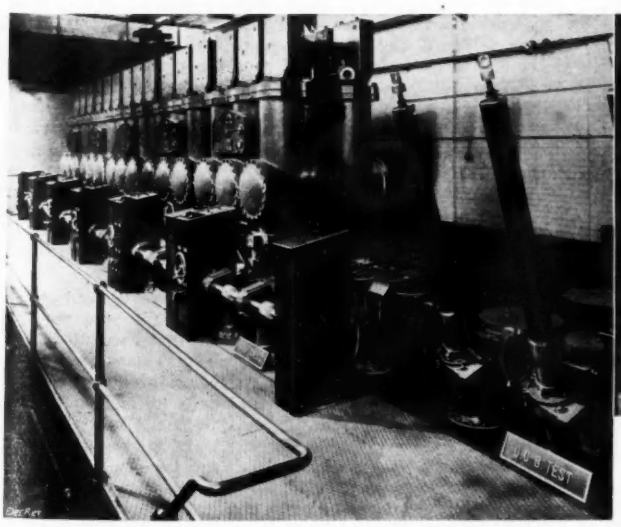
**The completely assembled circuit-breaker, showing terminal insulators and butt contacts for engagement in isolator chamber**

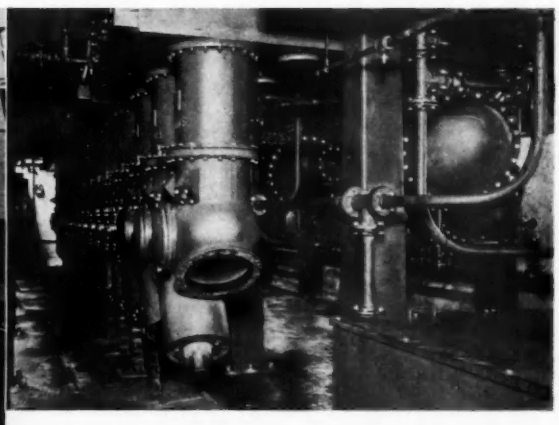
The breaker internal operating mechanism is of the pantograph type, giving a straight line movement throughout the stroke. Accelerating springs provide a no-load speed of 10 ft. per second and buffer springs and dashpots absorb the stored energy at the end of the opening and closing strokes.

The breaker is d.c. solenoid operated, and examination of contacts is allowed for by a hinged circular door at the front of each pole. Otherwise the operation of removing and replacing a breaker corresponds to plugging in and out conventional draw-out or drop-down metalclad equipment, with the exception that the oil must be first drawn off, full provision for which is made. The rupturing capacity is 750,000 kVA.

The 66-kV current transformers are of the ring type arranged to slip over a condenser bushing, the top end of which carries the hinge contact of the cable isolating switch and the lower end a terminal to receive the 66-kV cable. The chamber containing the transformers is oil filled and in communication with the cable isolating switch chamber.

Only the oil in the explosion chamber is actually utilised during the operation of circuit interruption. The remainder merely serves to insulate the contacting parts from the container, so that it is considered logical to reduce the inactive portion of the oil by employing two separate containers for each pole and by using solid dielectric to provide a multiple insulation path. On this basis of design the quantity of oil per breaker is reduced to 500 gallons, as compared with about 1,200 gallons in a conventional tank type breaker.





**Left: Front view of 400 A, 66-kV gear on operating gallery. Right: Side view showing circuit and bus chambers**

# MEETINGS AND DISCUSSIONS

## Current Topics and Opinions Expressed at the Institutions

### "Spreading" Distribution Costs

THE efficient use of distribution capital was the subject discussed at the informal meeting of the INSTITUTION OF ELECTRICAL ENGINEERS in London on November 12th.

In opening the debate Mr. J. M. Kennedy displayed figures showing what had happened during the last ten years with a large number of undertakings with regard to the costs of generation and distribution. It was clear that the causes which enabled undertakers to reduce the cost of generation per kWh were not reflected on the distribution side, for the distribution cost per kWh remained practically constant, with even a tendency to rise in the last year or so. Further, distribution costs which represented 33¼ per cent. of the total cost of energy ten years ago now represented 50 per cent.

He said that distribution capital included main transmission lines, sub-stations with their land and buildings, and all mains, services and miscellaneous apparatus used in connection with supplies to consumers' premises.

In some businesses efficient use of capital might be represented by the highest possible turnover, or the highest profit which could be obtained, but in the case of a public utility it was necessary to look at the matter from the point of view of the community as well as that of the owner of the undertaking and, therefore, efficient use could only be represented by the selling of the largest number of kWh per pound of capital.

Distribution costs had definitely increased with capital expenditure, although not quite proportionately; the percentage in the early stages was 17 per cent. and in the later stages it had gradually fallen to about 13.5 per cent. There had been, in effect, no effective reduction for the last ten years in the cost per kWh of distribution owing to the failure to sell an increased number of kWh per pound of distribution capital.

Too frequently the argument was used that it was quite impossible to reduce tariffs because distribution costs alone represented, say, 1½d. per kWh, as they would at 30 kWh per pound. The point which needed to be understood was that if tariffs were scientifically reduced so that the sales increased from 30 to, say, 70 kWh per pound, instead of bringing in an average revenue of 2d. per kWh, the revenue would only be 1½d. per kWh. Reduced tariffs enabled a greater number of kWh to be sold, but the selling of that extra number at the lower average price still brought in sufficient revenue to pay for the cost of current and to maintain a 15 per cent. return on the distribution capital to meet all annual costs and charges.

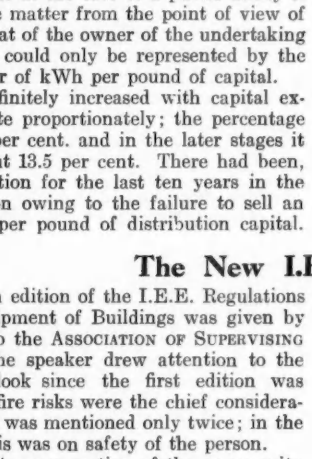
One of the most effective ways of increasing sales per pound was by increasing the load factor throughout all parts of the system, which could be achieved by encouraging the use of electricity for domestic and other apparatus used at off-peak times by introducing appliances for everyday use which must have a very large diversity factor between different types of premises.

It was of no use an undertaking adopting an assisted wiring scheme or a scheme for the hire of apparatus, &c., as a general principle unless every existing and potential consumer was told of the advantages which could be gained by all the means of publicity at the undertaking's disposal and it was of no use sending out as a canvasser for such work anyone who was not an expert in demonstrating the uses of electricity. Everyone connected with an undertaking should be in a position to speak from personal knowledge of the advantages offered and this could only be done if the undertaking was offering terms and facilities which made it possible for its employés of all grades to adopt an all-electric equipment.

### The New I.E.E. Regulations

A LECTURE on the tenth edition of the I.E.E. Regulations for the Electrical Equipment of Buildings was given by Mr. W. Lang on Tuesday to the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS. The speaker drew attention to the fundamental change in outlook since the first edition was brought out in 1882. Then fire risks were the chief consideration, and danger from shock was mentioned only twice; in the tenth edition all the emphasis was on safety of the person.

Mr. Lang pointed out that every section of the community interested in electrical installation work was represented among the thirty-five members of the Wiring Regulations Committee, and suggestions were welcomed from any source. No reference to cost was contained in the Regulations, but this aspect was evidently in the minds of the Committee and no item could be regarded as unnecessarily onerous. The view that regulations would necessarily increase cost showed ignorance of the benefit of method in industry.




[*Elliott & Fry*
**Mr. W. Lang**

As in former editions, British Standard Specifications had been incorporated where applicable, but the independence of the Wiring Regulations Committee was essential, as any attempt to control wiring regulations along the lines of a standard specification would not meet the needs of an industry so impossible of limitation as was the electrical industry.

Regarding the question of statutory enforcement, anything that would "freeze up" the Regulations so that an Act of Parliament would be required to give effect to alterations required to meet new conditions would retard the progress of the industry. To a large extent the recognition of the I.E.E. Regulations as the standard for installation work contained in the Electricity Supply Regulations, 1934, met the requirements of compulsion without putting the brake on development. Having in mind the various influences in the industry, Mr. Lang said that he regarded it as fortunate that the revision of the Wiring Regulations was still in the hands of the Council of the I.E.E., which was without academic or commercial bias.

The tenth edition, said Mr. Lang, although larger and so different in arrangement from its predecessors, was much better arranged and therefore more easily understood. Its most distinctive improvements were the grouping of its contents into well-defined sections, the elimination of distracting sub-sub-paragraphs and the simple allocation of section numbers in lots of 100. He hoped that later editions would retain the titles and order of the sections; a new regulation could now be added to any section without disarranging succeeding numbers. The contents page and index together made possible a quick reference to any subject.

For the definitions, numbering was abandoned and instead of following an imaginary itinerary through an installation, starting from the consumers' terminals, all definitions were now in alphabetical order. There were now seventy-eight definitions as against forty-nine (many of which had been dropped) in the ninth edition. The sectional regulations were preceded by four general regulations: (1) good workmanship—always assumed, now demanded; (2) an indication that old work was not necessarily subject to the Regulations; (3) additions to an existing installation; and (4) diversity factor.

The speaker then considered step by step the main body of the Regulations, and pointed out the principal differences between the ninth and tenth editions in those sections that were of especial interest to those engaged in installation work.

### Factory Lighting in Sheffield

SOME industrial illumination problems in Sheffield and their solutions are discussed in the paper by Mr. R. W. Daniel, H.M. Inspector of Factories, which was read before the ILLUMINATING ENGINEERING SOCIETY in London on November 13th.

The city contains about 3,000 registered factories in which power machinery is used and some 1,000 workshops in which it is not. The author briefly outlines the conditions prevailing in the basic industries and comments on the results of an inquiry conducted by the Factory Department of the Home Office, photometric readings being taken in 500 factories.

He says that the primary obstacle is of human and not of technical origin. Once the absolute necessity for suitable artificial lighting is accepted by the factory owner, the lighting engineer is left with a relatively easy task. In nearly every instance he can both improve the lighting and decrease the cost. Few factory occupiers attempt to improve the factory lighting, however bad, until favourable conditions seen elsewhere destroy faith in their own. A few well-lighted workshops, accessible to competitive manufacturers, thus achieve much by compelling unfavourable comparison.

Even among the most progressive factories the recent depression had been permitted to restrict improvements long overdue. Lighting contracts are still at times placed on price per point alone. Types of fittings, standards, and suitability of illumination are not then considered. It must be admitted that the heavy cost of reflectors, particularly local reflectors, had until recently undoubtedly hindered progress, but there has been an improvement in this direction. Recent reductions in the cost of electricity for industrial lighting have also done much to extend its use.

In the majority of factories visited, glare was prevalent, six only being entirely free from it; this was generally due to the continued use of the old shallow 10-in. conical reflector. Photometric observations show that to obtain from such a shallow reflector the same working intensity as that normally derived from a correctly designed model, a lamp of approximately double the wattage is necessary.

Of the factories visited only five provided for efficient lighting maintenance. Apathy in this matter is often as complete in those factories containing expensive modern fittings as in those in which older and cruder lighting still remains. In a large press shop, six out of eleven expensive adjustable bracket local points were without both the bulbs and the reflectors originally provided. Glaring portable hand lamps, unsuitably placed, had been substituted by the operatives. Yet a trifling attention could have provided lighting of a high standard.

As for the future, there is room for optimism, despite the gloominess of much of this recent survey. Confidence is returning, and during the past year over a hundred factories have carried out or have planned improvements.

## Heating and Hot Water in Large Buildings

THE paper on the application of electricity to space and water heating in large buildings created great interest when it was read by Mr. R. Grierson (Mr. D. Betts is joint author) and discussed at the Irish Centre of the INSTITUTION OF ELECTRICAL ENGINEERS on November 15th. This paper, like the one written by Mr. Grierson some years ago, was read in Dublin before London, and it is undoubtedly one of the most practical contributions so far to a subject which is becoming very rapidly of the greatest importance to electrical manufacturers and contractors. The paper includes many tables and graphs of a most useful character.

Mr. E. Westlake, moving the vote of thanks, said that the Northern Ireland E.S.B. had secured, after fierce competition with oil, the heating of the new regional broadcasting station. He had found it impossible to get reliable estimates of consumption of hot water, and it was difficult to see how such estimates could be anything but vague and misleading. Intelligent guessing was too exact a term for the haphazard shots in the dark which had to be made. Confirming what the authors had said about the cost of drying out new buildings, Mr. Westlake quoted a case in his recent experience in which the cost of the second year's heating would be 25 per cent. less than the first, solely on that account.

Mr. J. A. Kenny wished that he had had such a work of reference two or three years ago when he was designing heating and hot-water installations for the National Maternity Hospital, Dublin. He voiced the opinion of several speakers in recommending the use of small local water storage heaters for lavatory basins and the like, rather than tapping them off the main circulating system.

Mr. J. O'Farrell thought that the pioneer work of people like the authors was beginning to tell with architects and the public, one of the most hopeful signs being the magnificent installation at the new headquarters of the R.I.B.A. He stressed the importance of starting off well by insulating the building efficiently, and said that aluminium foil had been largely used for this purpose. In this connection Mr. Grierson said that disagreeable condensation effects might result, but the matter was due for discussion by the Heating and Ventilating Engineers. He warned his hearers against cavity wall construction in which an air brick course was used at the top and bottom of the outer wall for ventilation, because that in effect reduced the insulation by half.

Mr. Grierson's own experience led him to estimate the daily consumption of hot water at about 2½ times the capacity of the heater. Mr. O'Farrell said that observations in Dublin gave from twice to four times. He thought that the fourth use must be rather tepid when loading was based on an eight-hour recuperation period.

Mr. S. G. Bruty had found room thermostats very reliable, but the remote type was rather liable to be troublesome, chiefly owing to gas leakage. He thought that air-conditioning, which received attention in the paper, was becoming very important in industry.

Mr. Grierson thought the capital cost of equipment was high, and advised cutting out some of the "gadgets" which engineers seemed to like hanging about the plant. He had had no experience of immersion heaters arcing to the enclosing tubes and so causing serious leakages. A hand-operated main switch should be placed in a room separated from the boiler-room in case high temperature water escaped through a leak or a safety valve and flashed into the steam. For very intermittent and short-period heating, as in schools and churches, he suggested combining time-switches with thermostats so that the time-switch was not permitted to operate if the thermostat considered the external temperature not unpleasantly low.

Thermostats were apt to age towards a lowering of the setting, but could be checked conveniently if a mercury thermometer were fixed permanently alongside the immersion heaters. It was disconcerting to learn that overheating a room by 1 per cent. added 5 per cent. to the cost of heating. There could be no better argument for thermostatically controlled electric heating.

## Electricity and Water Supply

THIS is the title of a paper by Mr. W. B. Woodhouse, engineer and manager of the Yorkshire Electric Power Co., which was read under the auspices of the BRITISH WATERWORKS ASSOCIATION at the Public Health Congress and Exhibition in London on November 22nd.

To-day, the author said, the electricity undertakings in Great Britain supplied over 5,000,000 premises and were annually adding some 600,000 more. At this rate of extension supply in the near future would be available in all parts of the country for all purposes. In water supply the case for centralisation was different because surface waters could be stored in impounding reservoirs and underground supplies might be drawn from the vast natural storage so that, with the availability of economical means of pumping, either source of supply, or a combination of both, could be used to meet the public requirements.

Regional planning and co-ordination of water resources seemed to the author particularly desirable where both underground and surface supplies were available, and it was in such cases that the widespread availability of electric power should prove most helpful.

The average price of electricity for power had fallen in ten years by 35 per cent., and further reductions were assured as the use increased. Examples quoted in the paper of the cost of electricity in different circumstances illustrated that, as in the distribution of water, the cost of the distribution mains had an important influence on the cost of the supply and the capital charges might outweigh, many times, the cost of producing the electricity. Consequently any fuller employment of mains which had been provided for the house-to-house supply of electricity would benefit the community generally by spreading those overhead expenses.

This advantage was frequently greater in a rural area than would appear at first sight because, for mechanical reasons, the local transmission mains were of a larger size than would be necessary for domestic purposes alone, and had a spare capacity available for power supply in many parts of the general network. The addition of a power load was not only of advantage in lowering the cost to other users, but had also proved in a number of cases the justification for an extension of electric mains to sparsely populated areas which otherwise would have gone without.

In some cases the power demand for pumping could be reduced at the time of the electrical maximum or peak load, so that the overhead costs of generation and distribution were not increased, and the power could therefore be supplied at a specially low price. This could be arranged by the provision of service storage tanks, but in most cases there was a useful diversity between the times of the maximum uses of water and of electricity by the public. If this diversity were taken advantage of, it would enable electric power to be supplied at a specially low price, but in any event the use of electric power for pumping at the present level of prices was in general cheaper than that of oil or steam engines. The reasons for this were clear; the capital expenditure on boreholes and service storage tanks was the same whatever the source of power might be, but as compared with other means of power production, the first cost of electrically driven pumps and of the buildings and foundations for them would be much less.

In respect of maintenance and depreciation electrical plant had a further advantage that unlike the steam or oil engine it maintained its efficiency unimpaired, and operating costs did not increase with age. Moreover, such plant could be made entirely automatic and arranged to start and stop to meet the varying demands as they occurred. This was a particular advantage in rural districts where the pumping stations

were small and where the staff which maintained the electricity supply system could if required also inspect and maintain the pumping plant as part of their normal work and finally, the production of electricity in large power stations was relatively so economical that with a reasonably full use of the distributing mains the cost of the delivered power compared favourably with production on the spot.

The lowest charges for electricity in any area were assured when so far as was practicable every requirement for power, heat and light was supplied through the same distribution mains. The establishment of isolated power plants could only result in a retardation of the growth of the public supply system to the general disadvantage. As to the actual plant which might be used for electric pumping the various types were well known, but reference might be made to the two most important applications of electric power, namely, the booster pump and the automatic borehole pump and storage tank combination. The use of a booster pump as an alternative to the provision of additional mains was a well-tried means of increasing supplies from the reservoirs to the distribution area. An interesting example was the Lostock booster station of the Manchester Corporation waterworks. These electrically driven pumps were stated to have enabled a gravity flow of 29,000,000 gallons per day to be increased by 62 per cent. through existing mains whose lengths varied from 12 to 23 miles and to have, as a consequence, saved a large capital expenditure on additional mains.

The amount of boosting required, and therefore of electricity used, in any particular case would depend on the rate of flow and in many cases the augmentation might only be required for a few hours a day, so that not only the first cost, but also the annual cost of operation was a low one. Electric borehole pumps, with or without supplementary lift pumps for service reservoir control, were being more extensively used to supplement existing supplies as well as to supply small areas or individual houses.

## Electric Heating for Coal Hydrogenation

SOME of the mechanical difficulties encountered in the development and operation of experimental plant for the hydrogenation of coal and tar to produce motor spirit are discussed in a paper by Messrs. A. T. Barber and A. H. Taylor, which was read before the INSTITUTION OF MECHANICAL ENGINEERS in London on November 16th. Various methods of making joints for high-pressure and high-temperature pipes and cylinders are described. It was found necessary to use an electrically heated furnace to obtain a flat temperature gradient along the full length of the convertor, the agitating and stirring motions being obtained by a small motor drive.

Various convertors supplied by Messrs. Chemical Reactions for use at the Fuel Research Station, Greenwich, are enclosed in electric furnaces, formed in halves, in order to maintain the desired temperature along the whole length of the reaction space. The temperature is measured by thermo-couples in pockets in the end covers. Such external heating has certain disadvantages, to overcome which internal heating was tried. The catalyst chamber is a tube surrounded by another tube carrying the heater winding which is separately controlled in sections.

Considerable trouble was experienced at first with the electrical connections. The three pairs of leads for the top, centre, and bottom of the heater are connected to six electrically insulated terminals, which have to withstand the working pressure of 3,000 lb. per sq. in. Coned shoulders on the leads bear on fibre bushes in coned seatings in the terminals. The fibre is thus compressed by the internal gas pressure between the shoulder and the seating.

It was comparatively easy to make a tight joint giving good electrical insulation between the various leads and to earth, but on heating, water vapour displaced from the thermal insulating material, &c., condensed on the fibre bushes and around the connections. This condensation soon reduced the electrical insulation to a low figure. It occurred both when the terminals were at the top and at the bottom. Water is also a product of the hydrogenation of tar, and when certain experiments were conducted in which the catalyst chamber was in communication with the heater space for the purpose of pressure equalisation, diffusion of the vapour products was a continuous if small source of moisture.

The amount of this moisture was sometimes quite remarkable. Experiments were directed towards preventing the access of water to the fibre and connections and a heavy oil, obtained from the process, placed round the terminals has proved effective. The effect of hydrogen and hydrocarbon vapours on the heaters has also provided interesting problems.

The electrical and thermal aspects are to be dealt with more fully in a paper by another member of the staff of the Fuel Research Station in the near future.

## Planning Industrial Development

IN a speech delivered to-day at the National Housing and Town Planning Council, on "Industrial Development in Lancashire and the Work of Local Authorities," Mr. Hugh Quigley, chief economist to the Central Electricity Board, advanced ideas to form the basis of a policy of action in clearing up the industrial position that has developed in recent years.

He referred to the responsibility of the community as represented by local government authorities for the economic and industrial future of Lancashire. He held that investigation would show that Lancashire could itself quite considerably reduce the volume of unemployment within its own boundaries by its own deliberate policy. The local authorities were very large consumers of iron and steel and engineering products, while they as owners or administrators of electricity systems influenced very large expenditure on generating plant, distributors' and consumers' equipment, and so on. In preparing a regional plan they must begin by studying those sections of industrial activity which could be influenced by deliberate local action. A survey or a careful assessment of ways and means was a necessary preliminary to regional planning.

As an example of the ability of local authorities to effect industrial development in their areas Mr. Quigley gave the following:—Lancashire is noted for its electrical manufacturing industry which is concentrated in the vicinity of Manchester and Bolton, with isolated factories in Liverpool and Preston. It gives employment to between 40,000 and 50,000 workers in Lancashire alone. "Yet one finds that in the great majority of Lancashire municipalities which have gas and electricity departments, the rule has been to hold up electrical development apparently in order to preserve the investment of the Corporation in gas."

He continued: "That policy has no broad economic or financial justification. It is the duty of a local authority to pass on at once to the public any advantages which modern technique can bring to the public services. If electricity is cheaper and more efficient, then it should be given full liberty to advance and carry out its civilising work. If gas is cheaper and more efficient, then it should be encouraged. A policy of blank negation to hold safe a vested interest defeats itself since the more such interest is defended, the less economic value it assumes."

He submitted that a policy of discrimination had no local justification so far as Lancashire was concerned, because the electrical group of industries in Lancashire itself gave employment on the manufacturing side to almost eight times the employment given by industries manufacturing gas appliances. The net result of restriction in development in this direction had been to reduce the capacity of the electrical manufacturing industry to employ more local labour and to strengthen its competitive position in other parts of the country and outside the country.

The development of a regional planning scheme would probably remove this source of weakness since the broader and more fundamental issues would prevail. The speaker went on to suggest various ways in which local authorities operating on a regional plan could assist employment and increase activity on a sound basis, and ended by urging Lancashire to face up to the most dangerous and difficult economic problems of the present time and find a solution which would re-establish its industrial and economic prestige.

### Supervisory Control of Power Systems

SELECTIVE remote control of power stations with the aid of automatic telephone-type switches was the subject of the paper by Mr. H. M. Yells which was read before the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS on November 16th. From a recent census it appeared that the ratio of the aggregate value of the loads to the total capacity of generating plant installed was 100 to 178, indicating a plant capacity of about 78 per cent. in excess of the maximum demand. The interconnection of the generating stations by means of a grid system enables this excess to be reduced to a more rational figure of 20-25 per cent. with corresponding saving in capital expenditure. Interconnection will also enable the total output required to be distributed among the various selected stations more efficiently, the advantages of interconnected systems being analogous to "grading" in automatic telephony, in which case a "grid" is used in the form of common trunks to absorb overflows of traffic from several groups of apparatus. The paper deals only with the d.c. system of signalling, which is suitable for circuits not longer than forty miles. Pulses are transmitted with normal or reversed polarity so that polarised relays will respond to current flow in one direction only. Methods of signal checking, fault indication, and distant meter reading are explained.

# Correspondence

*Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession*

## Changing the Voltage

There is a statement in Mr. Fowler's article in your current issue which should not be allowed to pass without comment. Mr. Fowler says that "strictly speaking the legal obligation to change consumers' apparatus free of charge can be confined to the apparatus of which the supply authority has cognisance."

No supply authority is allowed to change its system of supply until it has obtained the sanction of the appropriate body, in most cases the Electricity Commissioners. One of the conditions attached by the Commissioners to their consent is that "the undertakers shall at their own expense carry out the necessary alterations to consumers' existing apparatus."

I should like to know Mr. Fowler's authority for his suggestion that the words "existing apparatus" have the same meaning as the words "apparatus of which the supply authority has cognisance." ELECTRODE.

*November 16th.*

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In his article in your issue of November 16th, Mr. Fowler states "Strictly speaking, the legal obligation to change consumers' apparatus free of charge can be confined to the apparatus of which the supply authority has cognisance." What are the legal enactments Mr. Fowler relies upon for this conclusion?

The consumer, as a condition precedent to obtaining a supply, has to state the "maximum power" required, but is he under any legal obligation, assuming he wants, say, 6 kW and does not desire to avail himself of the lower rates offered for supplies to certain classes of apparatus, to declare whether he proposes to use his 6 kW for supplying 100 60-W lamps, or 100 60-W mains-driven receiving sets, or, in fact, anything he chooses? WOKING ELECTRIC SUPPLY CO., LTD.,

Woking, *Nov. 19th.* F. WOODS, *Resident Engineer.*

## A Manchester Example

The spirit of the unique gathering in Manchester, mentioned in your issue of November 16th, is obscured by the statement that the meeting was convened by the supply authorities. The Manchester contractors do not believe in holding meetings behind closed doors, and therefore appreciate Mr. H. C. Lamb's unfailing courtesy and encouragement in accepting the Association's invitation to provide the paper in question.

The subject of shoddy material and work cannot be disposed of in one evening, so a further effort will be made to provide manufacturers with an opportunity of discussing the merits of the exhibits, and affording the public the protective measures to which they are entitled. L. E. WILSON.

Manchester, *November 17th.*

## A Lighting Stand-by

A series of failures on individual installations occurring at busy periods in the shops of a large multiple firm, resulted in a suggestion that means should be adopted to secure immediate emergency lighting.

The following method was adopted for obtaining a supply of current from adjoining premises, and it may be of interest to some of your readers. Alongside the distribution board is fixed a suitable d.p.d.t. change-over switch, to which the best circuit for giving illumination over the counters is taken. On an adjoining hook is left a length of twin cab-tyre flex (with an adaptor attached) long enough to reach to the nearest lampholder in an adjacent building, with the owners of which an arrangement had been made. The easiest path for paying out the cable was prearranged, and one assistant was made responsible for the connection immediately failure occurred.

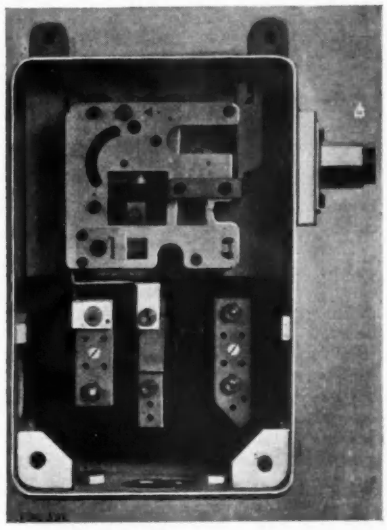
This scheme has been found so useful in the case of an emergency that it has been decided to equip similarly further shops, where failures have occurred. The system is, of course, effective only in the event of a local fault, and of no use when the fault is on the mains. BEN QUARMBY.

Manchester, *November 14th.*

## The I.E.E. Regulations

In connection with the excellent suggestion made by Mr. J. W. Record in your issue of November 9th that the Institution should set up a committee to deal with ambiguities in its Regulations, I would suggest that the same committee should have power to certify new apparatus for general or restricted use when it meets the required conditions of safety. On page 2 of the Regulations the reference to not discouraging invention or new appliances implies the existence of some committee to consider new apparatus which must be submitted to some authority.

There is an important commercial consideration involved, namely, that the Regulations may discourage the use of electricity because of the high cost of apparatus which complies with them. Thus, the cost of a 50-A circuit-breaker having a 30-mA relay to control a no-volt or volt-energised coil trip circuit is about £8 single-pole, or £10 for a d.p. break. A 25-A leakage-actuated switch similar to the foregoing is £5 plus the cost of case and terminals for meter connections.



**A Ferranti prepayment meter switch with wax thermal release**

I enclose a photograph of the experimental switch mentioned in previous letters; this switch costs 50s. and meets the operating conditions, but it does not comply with the I.E.E. Regulations, although it will clear 200 A at 400 V and trip with 1 A with a conduit to earth, the voltage rise not exceeding 3 V; the trip will stand the full line pressure of 230 V. The switch provides for splitting a twin 19/.056 cable for two meters, and interrupts the "live" pole in the event of leakage. The switch can be removed without disturbing the cable connections, is closed by push-button, and the whole unit can be enclosed and sealed against interference.

Leakage-actuated switches cannot usually be duplicated if more than one meter is required, otherwise the trip circuits will be in parallel, so that a fault has to develop until two or more trip devices can be energised together. A voltage rise on a conduit system requires interruption of the "live" pole before it is split for meters. The protective switch is therefore connected to unmetered current terminals and must be under the seal of the supply authority. These considerations led to the construction of the experimental switch.

It is unlikely, however, that this experimental switch will go into production until the Regulations permit, or do not prevent, its use. Still, switches that do comply with the Regulations are expensive, and therefore may not be adopted, in which case the purpose of the Regulations to prevent accident would be defeated. A. G. BULLEN.

Liverpool, *November 19th.*

## Engineers and Trade Questions

Writing under this heading in your issue of October 26th (page 578), "Business Man" comments on remarks made by Mr. Harrison at the opening meeting of the Liverpool and District Engineers' Economic Study Group and on the usefulness of such groups in general. Mr. Munro, in your issue of November 9th, writes in a similar strain. I think that they have both misunderstood the objects of these so-called Economic Study Groups.

The term "economics" covers a very wide field indeed, and I do not think the members of these groups would claim that they are attempting to deal with the whole subject. I do not think the scope of their aims can be better defined than in the following statement, issued by the London Group:—

> "We as a representative group of engineers and scientific workers are dissatisfied with the fact that the community is not enjoying a standard of living and leisure commensurate with the potential advancement for which science and technology are responsible, and we are meeting to discuss why the paradox arises and how it can be resolved."

Even more briefly their scope can be described as studying the problem of "Poverty and Plenty," to use the title given by the B.B.C. to the series of broadcast talks on the subject, but from the special viewpoint of the engineer and scientific worker. There is sufficient in this problem to keep the groups very busy without their attempting to dictate to the colleague who, by his knowledge of some phases of economics, accountancy, &c., is competent to look after the commercial side of

the industry. On the other hand, the professional economist, as distinguished from the business man, has often propounded theories which show a lack of appreciation of the incidence of engineering development on human life.

In this country, where some measure of recovery has been attained and some branches of industry, including sections of the engineering industry, are even prosperous, there are some advocates of the policy of "*laissez faire*" who believe that it will right itself in time. On the other hand, abroad, in the United States, Germany, Italy, Russia, &c., widely different and very drastic steps are being attempted to deal with the problem, and the time may come before long when we here will be asked to authorise some very drastic change. Is it not then advisable that the ordinary citizen should endeavour to get some little understanding of the causes and possible cure of the problem before he gives the professional economist and politician a mandate to take steps which may be in such opposite directions as the solutions attempted in Italy and Russia? Is it not still more appropriate that the engineer should equip himself in this way since the problem is so closely concerned with his profession that any solution can hardly fail to be one which will affect the engineering industry most closely?

There has been directed at the Economic Study Groups the criticism that they are, or will tend to become, political in character and that politics and engineering cannot go hand-in-hand, but after all in a democratic country can any change be made, or resisted, without political machinery being the medium? The grid itself is surely a case of this, and Ferranti's early efforts have only so eventually been realised. If we do not put ourselves in the position to discriminate between solutions we shall be at the mercy of the professional politicians who will virtually be dictators of the functions of the engineering industry in the life of the community. It was for this reason that Mr. Harrison advocated that engineers should not leave everything to the professional economist.

As further justification for the existence of the Study Groups I would quote from such an unextreme organ as *The Times*, which in its leading article on November 3rd, 1932, said:—

> "The problem which is now perplexing mankind is to discover by what flaw or flaws in our system it has come about that the world, never better equipped both in knowledge and machinery to produce all its needs, is forced to see so much of that knowledge and machinery lying idle while millions of willing workers are unemployed and in want. The professed authorities on these questions have expressed many conflicting opinions and have given such contradictory advice that the best hope of success seems indeed to lie in candid examination of the facts by men not professing to be experts and consequently unhampered by preconceived theories."

Whilst during the two years which have elapsed since this was written the position here and in some countries abroad has improved, the problem still remains and the steps to be taken to deal with it are still undecided. In the United States the crisis still exists and no one seems to know what will be the ultimate outcome of the conflict of the various conflicting forces.

So far as the Group with which I am connected is concerned, whilst it includes a few individuals who have been students of economics for a considerable time, the majority are engineers who are painfully conscious of their ignorance in the matter but welcome the opportunity of co-operating with others like-minded in endeavouring to see daylight through the perplexity of conflicting counsels. The practical difficulty experienced is that so few engineers have the time available to devote to the study, but the presence of all who sympathise with the aim of the groups is earnestly desired.

WM. PARRY,
*Hon. Sec. Liverpool and District Engineers' Economic Study Group.*

Liverpool, *November 16th.*

# Factory Power Costs. By Thos. W. Fazakerley

THE determination and frequent control of factory power costs are both points which call for the closest study if accurate results are to be obtained, and the high volume of consumption in many organisations to-day emphasises the possible chances for waste and extravagance in this direction. Whilst the actual cost of power generation may be reasonably constant there are certain extraneous charges which also must be considered which may render the inclusive cost per kWh a very variable figure.

*Wykeham Studios*

**Mr. T. W. Fazakerley is an associate of the Institute of Industrial Administration**

Power supplied from a central station at least is accompanied by a constant basic cost and also an alternative distribution is assured from an auxiliary plant; on the other hand, assuming that the power volume required is sufficiently large, generation in the factory offers a big inducement in the form of unit cost reduction.

Cost reduction by itself should not be the decisive factor, however, as in certain cases the actual cost per kWh of generated power may be similar to that obtainable from a central station, but the utilisation of exhaust steam, &c., in the factory may render it advisable to generate power in the factory itself.

The following is a skeleton cost comparison for the central station and individual plant. In item A the standby charge represents a fixed charge per kW for a certain minimum demand and after that a lower scale of charges for all excess demand. Item B is the actual energy charge assumed to be in a sliding scale on a reducing basis for growing consumption over a given period. For the purpose of cost comparison I have charged to the central station plant the additional cost of boiler and coal-handling operations and such cost should, of course, be added to the cost of energy to form a comparison with the individual plant cost. This plant is assumed to be steam driven.

| CENTRAL STATION | INDIVIDUAL PLANT. |
|---|---|
| A. Standby charge } charged to<br>B. Running charge } consumer. | F. Depreciation—repairs and insurance on station equipment, boilers, turbines, generators, switchboard, condensers, etc., and coal handling plant. |
| C. Cost of boiler plant—including interest, rent, coal and water and labour and supervision. | G. Cost of fuel and water for above. |
| D. Taxes, and depreciation and repairs to boiler plant. | H. Cost of labour and supervision. |
| E. Interest—maintenance and operating cost on coal and ash handling equipment (where such are necessary) | J. Cost of ash handling and removal. |

Wherever the supply comes from the problem of allocating power costs to the various factory sections remains unchanged. From the works accountant's point of view the question of accurate recording of sectional consumption is one of great importance both from the product cost and standing overhead charge standpoint. In the first place the total power consumption is divided between lighting (generally about 10 per cent.) and power (90 per cent.).

The lighting cost is then distributed sectionally on a room-wattage basis (assuming the hours of operating in each room are constant) whilst the power consumption cost is allocated on the horse-power total of each section or preferably, where possible, meter readings recording actual consumption per machine. The problem of power economy can only be studied scientifically when such figures as these are available and in the individual plant the following additional items of information should also be tabulated weekly: 1. Cost per kWh generated. 2. Cost per kWh consumed. 3. Value of power wasted. 4. Detailed analysis of all power house charges with especial reference to all wages. 5. Length of time wasted in breakdowns and causes of such breakdowns.

In considering the question of economy in electricity one can often effect a substantial saving with regard to the lighting bill. An example at this point may be interesting. A chocolate factory had an annual lighting bill of £2,000 and it was found that by changing the type of reflector used to a superior one the spacing of the light points could be increased considerably; the result was a clear annual saving of £600 in this item alone.

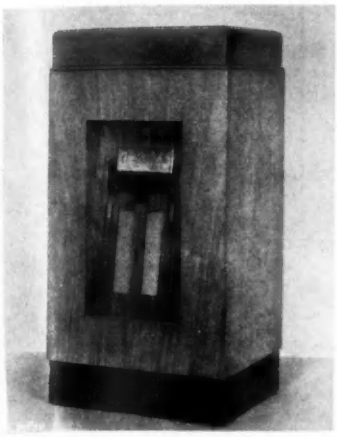
From the works manager's point of view the boiler house usually offers greater scope for economy and improved efficiency than the power plant—steam circulation for heating in particular will often show a loss of 40 per cent. whilst leaking pipe joints throughout the buildings require frequent attention.

Methods of measuring coal consumption are substantially the same as those described for power control, the only difference being that all main pipes should be tapped by meters to register the steam flow. If this is not possible the best alternative is to debit each pipe line with steam volume in proportion to its cross sectional area.

The methods of "feeding" the coal to the boiler—the regulation of time for such feeding—the actual analysis of the coal combined with close measurement of the calorific value are only some of the main factors to be studied from the factory or production point of view.

# New Apparatus and Devices

## for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes



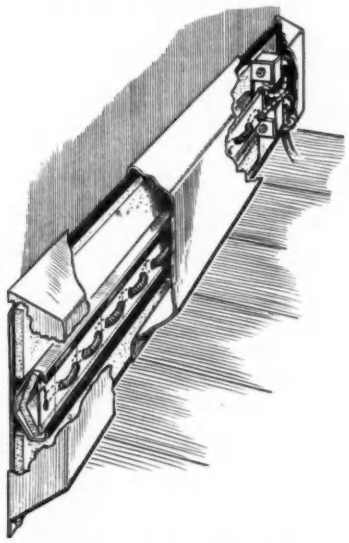
The "Arcadia Autogram"

### Ferranti Radiograms

Three new radiogramophones are being developed by MESSRS. FERRANTI, LTD., Hollinwood, Lancs, this season. These are the "Arcadia Autogram" (39 gn.) which is the same as the "Arcadiagram," but with an automatic record changing device; the "Lancastria" radiogram (24 gn.) and the "Lancastria Autogram" (33 gn.), the last-named embodying the standard "Lancastria" circuit and an automatic record-changing device.

### New "Unity" Products

For the heating of private houses and offices UNITY HEATING, LTD., Vincent House, Vincent Square, London, S.W.1, are introducing a skirting panel heater operating at a temperature of 180 deg. F. It is of pressed-steel construction and has a total height of 6 in. and a projection of 1½ in. The element is a continuous spiral mounted in sheet mica strips held in metal edges which form the return contact. The metal channel is backed with asbestos sheeting, as is also the remainder of the casing. Connections may be made at either end, and the cover is easily removed. The standard loading is 60 W per ft.



The "Unity" skirting panel heater

One point which may not immediately be apparent is that in erecting the heater the back plate on which the element and terminals are mounted is first of all screwed to the wall, using the upper row of holes provided. The front plate is then placed in position over the back plate and secured to the back plate and to the wall by means of screws inserted through the holes provided at the bottom.

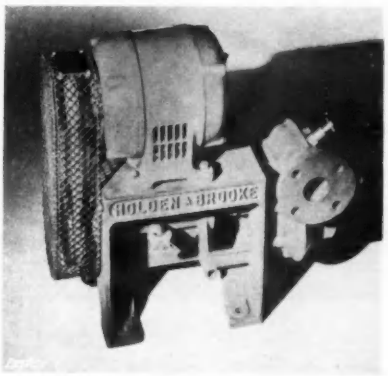
Another new production is the "Unity" convector designed for rooms where floor and wall space is limited. It is entirely automatic in operation, having a thermostat with an illuminated scale built into it. The required temperature is selected on the scale and the convector is then switched on and off automatically. Dark green and dark oak are standard finishes, while bronze is available at a slight extra charge. Various models are available with loadings of from 0.75 kW. to 2 kW.

The "Unity" convector

The type "Unim" 10-A room thermostat is also a new development. This instrument can be used on a.c. circuits where the load does not exceed 10 A; it operates through a robust bi-metal strip of unusual length. Temperature regulation is by a small hand-wheel and pointer, but a manually operated "on" and "off" switch is also provided. Cable entry is from the back and a special mounting block is available; a temperature range of from 40 to 80 deg. F. is provided for and can be used on voltages between 100 and 250.

### Flexible-speed Pumps

A new range of "Siflex" pumps has been developed by MESSRS. HOLDEN & BROOKE, LTD., Sirius Works, Manchester 12, with a view to enabling the most economical pump speed to be selected for any given duty, irrespective of the limitations set to the a.c. motor speed by the supply frequency. The drive is by a "V" belt subjected to treatment to prevent stretching. The shrouded gunmetal impellor in volute c.i. casings is hydraulically balanced to obviate end-thrust and runs on two sets of ball bearings. The glands and stuffing box are under inlet pressure only and internal inspection can be made without breaking joints.



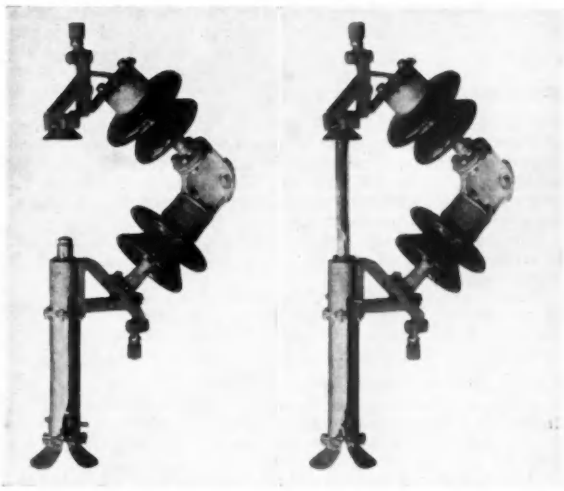

A "Siflex" pump

### Pull-down Fuse Isolators

The latest design of fuse isolators for pole mounting on 11- and 33-kV overhead lines evolved by SWITCHGEAR & EQUIPMENT, LTD., 49, Queen Victoria Street, E.C.4, ensures safety to the operator because when the fuse is withdrawn earthed metal work is definitely interposed between the live side of the isolator and the terminals of the transformer or other equipment which is being protected. Furthermore, there is no risk of the insulation being damaged when the fuse clears a heavy fault. It is possible easily to detect from the ground fuses which have blown, by reason of the clear gap caused by the collapse of the spring.

Size No. 2 liquid fuses have an estimated three-phase rupturing capacity of 150,000 kVA at 11 kV and 250,000 kVA at 33 kV. Being hermetically sealed, the elements are impervious to weather conditions. The fuses are easily replaced from ground level with a 16 ft. 6 in. operating pole, due to the light weight to be raised and lowered (only the fuse and one small clamp). The bell guide incorporated in the isolator is in the direct line of vision of the operator. The action of inserting the fuse in the contacts or in the isolating position automatically unlocks it from the pole head. Similarly, the action of removing the fuse from the contacts or from the isolating position automatically locks it in the pole head.

When desired a locked isolating position is provided in which the fuse can be left, instead of bringing it to the ground.



Left: Fuse inserted in locked isolating position. Right: Fuse locked in position

The high-pressure self-aligning contacts of the roller and cone type are rated to carry 100 A continuously. The insulators are specially designed; nine standard sizes are available.

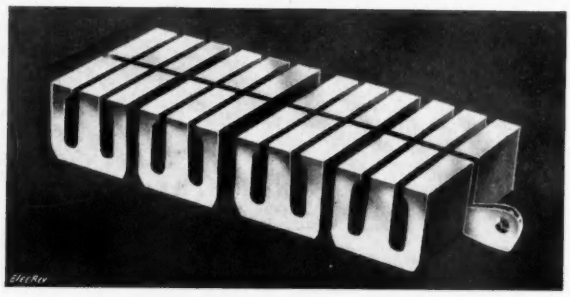
Operating rods in three portable 5 ft. 6 in. sections are fitted with pinned telescopic joints, rain shield, earthing ring and length of chain, and rubber grip handles. When necessary a stage of porcelain is inserted in the rod.

E

## Permanent Magnet Chucks

No use of an external electricity supply is made by the new magnetic chuck which has just been introduced by MESSRS. JAMES NEILL & Co. (SHEFFIELD), LTD., Composite Steel Works, Napier Street, Sheffield, 11. It utilises a permanent magnet, the alloys used having high coercive properties which provide a large magneto-motive force for driving the flux round the circuit.

The three linked magnets are magnetised to saturation so that the two outer poles are of opposite polarity to the centre



The " Eclipse " magnetic chuck

pole. In this form it is possible to concentrate the maximum magnetic flux into the smallest space and to assist the process of de-energising by a reduction in the number of separate magnets which would otherwise be necessary. This chuck is being exhibited on the stand of Messrs. Buck & Hickman, Ltd., at the Machine Tool & Engineering Exhibition, Olympia.

## An Improved " Duplex " Polisher

ELECTRONA ELECTRICAL PRODUCTS, LTD., Friday Street, Manchester, have now on the market an improved " Duplex 75 " electric floor polisher, a machine which has been specially designed for the polishing of hardwood floors, but is equally useful on linoleum, rubber, or composition. The machine consists of a ¼-h.p. motor, vertically mounted, and driving two horizontal revolving brushes through friction drums; these latter are mounted on special eccentric bearings, which automatically compensate for varying loads and take up any wear. The whole weight of the machine rests on the floor, so that no extra pressure is required, and owing to the design a floating action is obtained which eliminates any pull in either direction.

The " Duplex 75 " polisher

The guiding handle is completely insulated from the body of the motor and control is obtained by a convenient trigger switch. Polishing brushes are easily replaced by releasing two screws, and an outer brush encircling the base sweeps away all grit and dirt while polishing. The machine is constructed throughout of aluminium die-castings and steel pressings, so that the maximum efficiency is obtained; speed, power and weight have been carefully proportioned towards this end. A rotating internal fan provides adequate cooling, drawing air through screened inlets and exhausting through ventilation slots in the housing. The armature is run on ball bearings, with dust-proof ball oilers for lubrication, and all parts are ground dead true.

The capacity of the machine, which is priced at £12 10s., is given as 2,400 sq. ft. per hour, and it is guaranteed for twelve months.

Under test this polisher, the original model of which was introduced in 1925, gave an evenly polished surface to parquet floor 4 ft. by 10 ft. in 2 min. 5 sec.

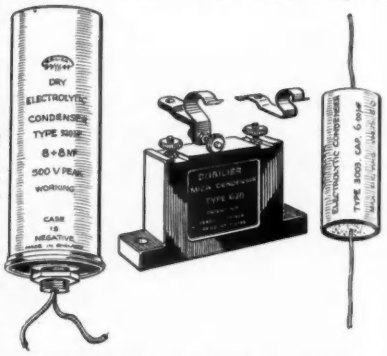
## A Quick-action Cable Stripper

A recent examination of the new " McGill's " lightning action cable-end stripper showed the tool to be soundly and robustly made. It is held in the hand with the thumb on the top of the stripper: pressure by the thumb brings the jaws together and cuts through the insulation, further pressure at the lower end of the stripper then draws one of the jaws away from the other, pulling the insulation off with it. After a little practice the whole operation can be done in one movement, and the stripper should therefore prove a very useful time-saver for the electrical wireman.

Two standard models are available at 8s. 6d. suitable for 3/.029 to 3/.036 v.i.r. and 7/.029 to 7/.044 v.i.r. Spare jaws can be obtained from the suppliers, MESSRS. LOTZ, ABBOT & Co., LTD., 21, Ropemaker Street, London, E.C.2.

## Dry Electrolytic Condensers

Samples of three new condensers have been sent to us by the DUBILIER CONDENSER Co. (1925), LTD., Ducon Works, Victoria Road, North Acton, W.3. There is a high-voltage dry electrolytic condenser for radio receiving sets where there is a polarising d.c. voltage which, with the addition of any alternating or ripple voltage, is below the maximum specified safe peak for the type used.




The three new Dubilier condensers

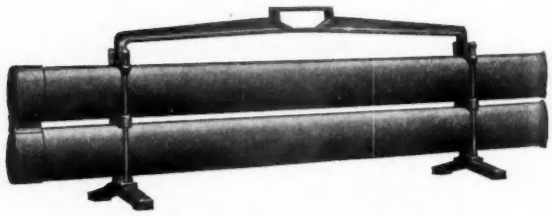
Reversible types have been designed primarily for use in universal and d.c. receivers to avoid the risk of damage to the receiver due to the reversal of polarity in the event of the mains plug being inserted the wrong way round. These condensers should never be used on unrectified a.c. only. When the aluminimum container type is used with the container earthed negatively special care must be taken to observe the correct polarity, and when used in voltage doubling circuits the container of the condenser on the positive side of the system must be insulated from the chassis or earth by a special washer.

Three types of this condenser are available: Standard models (500 V peak), multiple capacity sizes (500 V), or the reversible dry electrolytic type (275 V peak), with the case isolated or negative. Type 620 condenser is a new one available in sizes from 0.0001 to 0.005 mF. for 500 V d.c. working and tested at 1,000 V d.c.

There is also a range of new low-voltage dry electrolytic condensers in sizes of from 6 mF. to 4,000 mF. for voltages of from 10 to 100 d.c. No. 3003 is illustrated; it has a capacity of 50 mF. at a working voltage of 50. Type " AD " is rectangular, being used largely for smoothing the hum from the energised field of low-voltage moving-coil loud speakers.

## New " Maxheat " Heaters

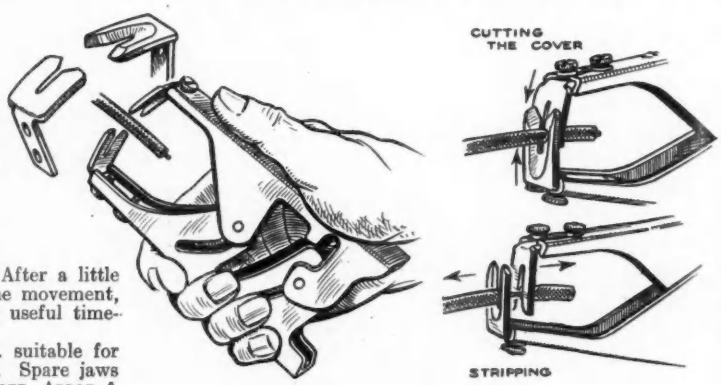
Standard " Maxheat " streamline oval tubular heaters are used in the new portable radiator now being made by the WARDLE ENGINEERING Co., LTD., Old Trafford, Manchester, 16. These heaters are fitted with end connectors, a carrying handle and floor mounting brackets having cast iron extended feet. Two, three or four tier models are available; the loading of each tier is 180 or 240 W and the prices range from £2 3s. to £3 17s. It is claimed that over 90 per cent. of the surface of a



The " Maxheat " portable tubular heater

" Maxheat " oval tube is swept by the rising air stream as compared with 60 per cent. in the case of a round tube.

Another newcomer is the " Maxheat " towel rail comprising an oval heater 30in. long secured by two cast end brackets supporting two upper and one lower bar. The tube is vitreous enamelled in black and the other parts are chromium plated. The loading of this heater, priced at £2, is 125 W. A 60-W model costing £1 10s. is also obtainable; this has one bar only.




The " McGill " quick-action cable stripper

# "Selling" Water Heating. By J. Russell Hickmott

## Methods of handling clients

THE problem of electric water heating from the point of view of the showroom staff is a very interesting one. Probably the average showroom salesman feels that the subject is one which it is impossible to give very definite information about in any case. Although this is partly true before a proposed installation has been inspected it is possible to give reasonably definite information if sufficient data is available.

The only information that a showroom salesman has at his disposal is that given verbally by the consumer. This may be extremely vague or, in some cases, a consumer may have taken a diagram of his pipe-work. Whatever the available information the majority of consumers wish for a definite answer to their questions before they will allow an inspection to be made. If these answers are not forthcoming they are liable to leave the showroom with the feeling that electric water heating is rather an indefinite problem or, alternatively, that the salesman did not know his subject.

A consumer in this frame of mind will probably visit the gas company and, unfortunately perhaps, will be able to obtain more precise information. This is not due to any greater powers possessed by the gas salesman but to the fact that the cost of heating water by means of gas may be quoted in numbers of baths. It is incumbent upon the electrical salesman, therefore, to be in a position to answer any reasonable question a consumer may put to him. The method of obtaining sufficient data to be able to give such information is really a matter of common sense combined with an observant eye.

Whatever type of electrical goods a salesman is attempting to sell he should first try to visualise, from the consumers' point of view, what the apparatus is expected to do and then advise accordingly. So many salesmen adopt the attitude of trying to impress a consumer with the many wonderful results to be obtained from a piece of apparatus without even bothering to discover the reason why the consumer felt that he wanted such a thing.

A consumer who walks into a showroom and asks for an electrical appliance of some description has obviously a special use to which he wishes to put it. He has probably talked the matter over with his friends and received some advice from them. In addition to this he is almost certain to have watched the advertisements in the papers and formed some ideas of his own. There is a possibility that he may have come to a wrong conclusion and has in mind an appliance which is not really suitable for giving the results that he wishes to obtain. It is, therefore, a showroom salesman's first question to ask what results are expected from the apparatus for which the consumer has inquired.

### Storage or Immersion Systems?

This applies even more especially to electric water heating. As a matter of interest I called into two supply authorities' showrooms and made inquiries for an electric water heater. The first question I was asked was, did I want a self contained storage heater or an immersion heater? I wonder how many consumers would understand either of those terms? To my mind it is for the salesman to advise, as far as possible, which of these installations will be the more useful. A few questions, put to the consumer, will elicit sufficient information to enable a decision to be made. If there is no existing hot-water installation the question of an immersion heater does not arise.

In the modern house the kitchen is nearly always situated immediately below the bathroom and it is usually a comparatively simple matter to persuade a consumer, who originally inquired for a small heater over his sink, to have a larger heater fitted sufficient to give a supply to his bathroom as well.

A mistake that is often made is to under-quote the running costs of an installation. In practically every case it is possible to give a fairly accurate estimate if a little thought is given to the problem. Numbers of booklets are published which give the average consumption of the different types of water heating installations that are available. The Electrical Development Association gives, for instance, 60/80 kWh per week for the fully automatic installation supplying the usual three taps. Even by taking these published averages as a basis it is possible to quote a figure that will not be misleading to a consumer. Of course, the individual characteristics of the installation must be carefully considered and any departure from the normal use should be allowed for.

It is an unparalleled error to make a guess at the consumption of any electrical appliance and then quote it to a consumer. The average consumer is very suspicious of the cost of running electrical appliances and it only confirms his suspicions if you quote him say one shilling per week for constant hot water when you know full well that such a thing, at ½d. per kWh, is impossible. The majority of supply authorities have usually taken a number of tests, on consumers' premises, of the various types of water heating installations and the results of these tests are usually available to anyone who will take the trouble to ask for them.

### Plumbing and Lagging

It is usual for the plumbing part of the installation of a water heater to be charged to the consumer and, where this is so, the cost is a matter of importance and usually forms part of a consumer's original inquiry. Although it is impossible to give a definite quotation a rough guide can usually be afforded. It is unfair, both to the consumer and the engineer who will give the actual quotation, to give an estimate that is too low.

This type of thing may prolong the contact with the prospect but it is really only a waste of time. The consumer who thinks that he will get an estimate in the region of say one pound but finally finds that it is more like three pounds, is usually so "fed up" that he will have nothing more to do with the matter. If, however, he had received some warning that his plumbing charges would be fairly high he is more likely to give the matter further consideration.

Another point that is often the cause of serious dissatisfaction with an immersion heater installation is the lagging of the hot water tank. Much has been written of the importance of lagging and there is no doubt that, in the average house, the added efficiency is much overrated. Unless a tank is situated in a suitable position the thickness of lagging that can be used is usually only about one inch, which is insufficient for fully automatic working.

It will often be found that the consumer has very fixed ideas regarding the economy of lagging and these should not be allowed to remain if the possibilities of effective lagging appear to be remote. Some consumers have the idea that if their tank is lagged no heat is lost or, if it is, very little. This gives them a false impression and it is quite possible that they will even leave the heater switched on while they are away for the week-end. Although this waste of current does not usually extend beyond the first quarter it is sufficient to produce a feeling of distrust in the mind of the consumer. In addition it is hardly likely that such a consumer will recommend electric water heating to his friends and acquaintances and thus one of the finest advertising media is lost.

It is little difficulties like these that retard the proper development of the electrical industry, not only in the field of water heating, but in practically every branch.

# New Books

**Electrical Engineering Design-Class Manual.** By S. PARKER SMITH and M. G. SAY. Pp. 221; figs. 107. London: Oxford University Press. Price 5s. net.

This book gives an outline of the design-office courses given at the Royal Technical College, Glasgow, since 1923, and it assumes a knowledge of the theory of electrical machines, the characteristics of windings and magnetic and electric circuits and also of vector operational methods of a.c. circuit analysis. It gives an introduction to the physical principles underlying design methods, particularly stressing graphical methods; the latter cannot be commended too highly. The first chapter deals with the principles of the design of rotating machines, and the second with the main requirements of B.S.S. 168-1926, 171-1927 and 269-1927.

Heating, cooling and ventilation are then discussed, with some special reference to transformers. In the chapter describing the characteristics of the magnetic circuits of machines and transformers an interesting study of flux leakage phenomena is made. Magnet coils and armature windings for d.c. and a.c. machines and mathematical and graphical treatments of regulation and V-curves of synchronous machines are fully dealt with.

The principles of vector inversion in variable component series-parallel alternating circuits are applied to the study of current locus diagrams of induction and synchronous-induction motors. In illustrating briefly the factors governing the design of core-type transformers, the design details of a 500-kVA 6,600/384-volt, 50-cycle, single-phase unit are given, as an example. Formulæ and typical designs of d.c. and induction motors conclude the first part of the book. The second part is concerned with the requirements and design of starters and field regulators for d.c. and a.c. machines, railway speed-time curves and energy consumption, and, finally, with harmonic analysis.

The scope of the contents of the book has been given at some length for a specific reason: we have become so accustomed to highly priced text-books that it might be thought a book published commercially at so modest a figure could not contain (in spite of the eminence of its authors) really "worthwhile" subject matter, but the reader need entertain no fears on that score.

Mr. Milford, the publisher, is to be congratulated on his enterprise, which leaves us wondering whether he intends pursuing the idea of publishing this class of work in other fields of electrical engineering; there is plenty of scope for such a venture.

* * *

### Shorter Notices

"Smoke and Noxious Fumes; a Treatise on the Law relating thereto." By the late R. A. Glen. Pp. 24. Manchester: National Smoke Abatement Society. Price 1s.—This little book is intended as a guide to those concerned with the legal aspect of atmospheric pollution, whether as potential offenders or as responsible for the administration of the law. The operation of the law is clearly defined in relation to smoke emitted from dwellings, business premises, railways, steamships and road vehicles. A chapter is devoted to the special position of London with regard to legislation dealing with the emission of smoke—a general term which includes ash and gritty particles.

"A First Year Engineering Drawing." By A. C. Parkinson. Pp. 168; figs. 267. London: Sir Isaac Pitman & Sons. Price 5s.—This is a second edition of a work originally published last year. It is designed to cover the requirements in machine drawing of the first year national certificate course in mechanical and electrical engineering, but no examples of specifically electric practice are given. The first edition was reviewed in our issue of April 14th, 1933.

"Surveying for the Drawing Office," by L. C. Stanley. Pp. 51; illus. 28. London: Draughtsman Publishing Co., Ltd. Price 3s.

"Memories of a Scientific Life," by Sir Ambrose Fleming. Pp. 244. London: Marshall, Morgan & Scott. Price 5s.

"The Submarine Cable," by Capt. S. A. Garnham and R. L. Hadfield. Pp. 242; illus. London: Sampson Low, Marston & Co., Ltd. Price 10s. 6d.

# British Overseas Electrical Trade

## Exports exceed £1,100,000

THE total value of electrical goods exported during October reached the satisfactory figure of £1,159,902, according to the Board of Trade returns. The increase, compared with the corresponding month of 1933, was £310,135, or 36 per cent. It is necessary to take into account an extra working day in October of this year, but even so the exports show a substantial improvement. So far this year the increase in electrical exports has amounted to £1,463,256.

The largest advance was in unenumerated electrical goods and apparatus (£72,198). All Empire markets expanded, South Africa to the extent of over £90,000. On the other hand, the Soviet Union took machinery to the value of only £64 from this country, compared with £11,271 in October, 1933, and £49,819 in October, 1932.

With regard to imports, the decline in September was followed by an increase of £32,830 in October, the total for the month being £347,100. The increase was equivalent to about 10 per cent.

From the table given below it will be seen that the value of goods and apparatus exported rose by £259,539 to £874,192, representing an increase of 42 per cent. The following brief analysis shows the destinations of some of the items included in this category, the figures for October, 1933, being given in parentheses:—

Rubber-insulated wires and cables:—South Africa, £24,893 (£16,156); Australia, £24,762 (£15,166); British India, £17,607 (£16,813); New Zealand, £5,115 (£4,789); other British countries, £14,004 (£9,283); foreign countries, £7,492 (£8,840).

Electric wires and cables (insulation other than rubber):—India, £29,219 (£8,727); South Africa, £26,365 (£15,509); Australia, £13,008 (£14,463); other British countries, £10,642 (£3,970); foreign countries, £10,046 (£6,476).

Telegraph and telephone apparatus (not radio):—South Africa, £26,417 (£19,772); Australia, £15,274 (£4,155); Canada, £1,419 (£498); other British countries, £20,577 (£8,191); Argentina, £7,227 (£510); and other foreign countries, £34,499 (£39,111).

Electrical goods and apparatus were imported into this country from the following sources:—United States, £76,165 (£49,286); Germany, £75,391 (£76,694); Netherlands, £61,097 (£50,603); Switzerland, £17,875 (£15,671); France, £11,188 (£16,811); Belgium, £8,064 (£9,677); Austria, £8,014 (£15,618); other foreign countries, £26,798 (£27,821); British countries, £10,644 (£15,365).

Vacuum cleaners were supplied by the following:—Canada, £6,828 (£11,432); Sweden, £4,814 (£2,815); Germany, £796 (£993); United States, £712 (£404); other foreign countries, £2,198 (£2,081).

### EXPORTS AND IMPORTS DURING OCTOBER

| | Exports. Oct., 1934. | Exports. Inc. or dec. compared with Oct., 1933. | Imports. Oct., 1934. | Imports. Inc. or dec. compared with Oct., 1933. |
|---|---|---|---|---|
| Submarine telegraph and telephone cables | £2,198 | − £31,964 | * | — |
| Telegraph and telephone wires and cables (not submarine) | 49,796 | + 30,101 | * | — |
| Other insulated wires and cables | 183,153 | + 62,961 | £22,310 | + £17 |
| Radio receivers (excluding valves) | 31,343 | + 6,225 | 29,246 | + 4,864 |
| Radio transmitters (excluding valves) | 19,706 | − 8,889 | * | — |
| Radio valves | 43,579 | + 7,783 | 29,723 | + 2,768 |
| Other radio parts and accessories | 68,624 | + 28,719 | 64,567 | − 2,066 |
| Telegraph and telephone apparatus (other than radio) | 105,413 | + 33,176 | * | — |
| Electric carbons | * | — | 13,650 | + 2,099 |
| Incandescent lamps | 56,717 | + 21,353 | 13,027 | − 1,309 |
| Other lighting apparatus | 42,123 | + 14,426 | 32,775 | − 2,278 |
| Primary batteries | 22,461 | + 2,436 | 912 | + 101 |
| Accumulators | 54,351 | + 15,734 | * | — |
| House service meters | 12,580 | + 4,394 | * | — |
| Other electrical instruments | 13,175 | + 886 | 26,542 | + 5,075 |
| Unenumerated electrical goods and apparatus | 168,973 | + 72,198 | 62,484 | + 8,419 |
| Electric generators up to 200 kW. | 22,049 | + 6,288 | * | — |
| Electric generators over 200 kW. | 18,069 | − 4,922 | * | — |
| Electric motors | 88,651 | + 20,857 | 13,888† | + 4,689 |
| Convertors and transformers | 34,505 | + 4,738 | * | — |
| Starting and controlling gear for motors | 27,186 | + 4,834 | * | — |
| Switchgear | 84,768 | + 20,321 | * | — |
| Other electrical machinery | 10,482 | − 1,520 | 22,615 | + 12,815 |
| Electric vacuum cleaners | * | — | 15,361 | − 2,364 |
| | £1,159,902 | + £310,135 | £347,100 | + £32,830 |

* Not classified separately. † Not railway and tramway motors.

### BRITISH ELECTRICAL EXPORTS DURING OCTOBER

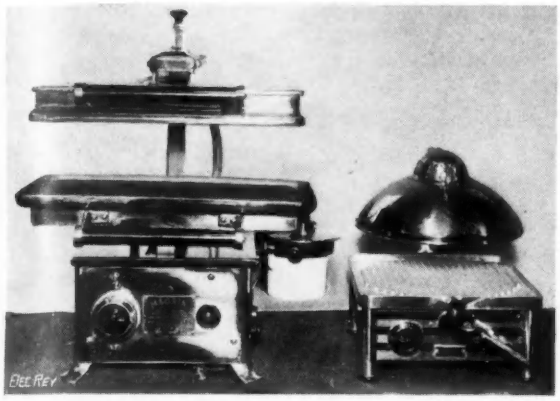
| Destination. | Goods and apparatus, Oct., 1934. | Inc. or dec. compared with Oct., 1933. | Electric generators, Oct., 1934. | Inc. or dec. compared with Oct., 1933. | Motors, Oct., 1934. | Inc. or dec. compared with Oct., 1933. | Other electrical machinery, Oct., 1934. | Inc. or dec. compared with Oct., 1933. |
|---|---|---|---|---|---|---|---|---|
| Irish Free State | €57,421 | + £14,951 | * | — | * | — | * | — |
| Union of South Africa | 162,169 | + 73,032 | £16,042 | + £1,905 | £25,028 | + £13,156 | £37,634 | + £3,200 |
| British India | 117,574 | + 45,802 | 4,069 | − 208 | 17,002 | + 10,276 | 31,679 | + 3,755 |
| British Malaya | 17,346 | + 10,893 | * | — | * | — | 7,377 | + 3,927 |
| Ceylon | 6,387 | + 2,805 | * | — | * | — | * | — |
| Hong Kong | 6,251 | + 20 | * | — | * | — | * | — |
| Australia | 92,093 | + 31,343 | 5,667 | + 4,105 | 10,248 | + 4,806 | 18,127 | + 14,929 |
| New Zealand | 39,435 | + 17,360 | * | — | 3,718 | + 871 | 4,949 | + 2,867 |
| Canada | 6,164 | + 1,232 | 367 | − 253 | 4,771 | + 3,018 | 1,058 | + 187 |
| Other British Countries | 65,035 | + 24,951 | 5,182 | + 35 | 13,121 | + 7,356 | 18,546 | + 5,913 |
| Sweden | 33,424 | + 23,432 | * | — | * | — | * | — |
| Denmark | 13,428 | − 21,065 | * | — | * | — | * | — |
| Belgium | 21,343 | + 5,846 | * | — | * | — | * | — |
| France | 12,863 | − 21,017 | * | — | * | — | 2,442 | − 5,076 |
| Spain | 6,519 | − 268 | * | — | * | — | * | — |
| Italy | 41,145 | + 23,570 | * | — | * | — | * | — |
| Greece | 3,488 | + 2,120 | * | — | * | — | * | — |
| Egypt | 11,006 | + 3,232 | * | — | * | — | 3,810 | + 3,390 |
| China | 20,912 | − 8,516 | * | — | * | — | 2,925 | − 1,533 |
| United States | 1,699 | − 235 | * | — | * | — | * | — |
| Argentina | 25,042 | + 12,945 | * | — | 1,564 | + 1,069 | 1,559 | + 63 |
| Soviet Union | * | — | — | − 133 | — | − 6,289 | 64 | − 4,785 |
| Netherlands | * | — | 829 | + 740 | * | — | 1,125 | − 1,318 |
| Other Foreign Countries | 113,448 | + 17,106 | 7,962 | − 4,825 | 13,199 | − 13,406 | 25,646 | + 2,854 |
| Total | £874,192 | + £259,539 | £40,118 | + £1,366 | £88,651 | + £20,857 | £156,941 | + £28,373 |

* Not classified separately.

# Public Health Exhibition

THE Public Health Congress and Exhibition, which is being held at the Royal Agricultural Hall, Islington (November 19th to 24th), demonstrates the extent to which electricity is now utilised for the preparation and serving of food in hospitals and institutions. For instance, hot food conveyor trolleys under thermostatic control, automatic toasters, fish fryers, mincers and slicers, potato peelers, a rapid griller, and a "browner-off" consisting of an inverted bowl radiator are shown by Messrs. Frank V. Magrini, Ltd.

A potato peeling machine is among the kitchen equipment of

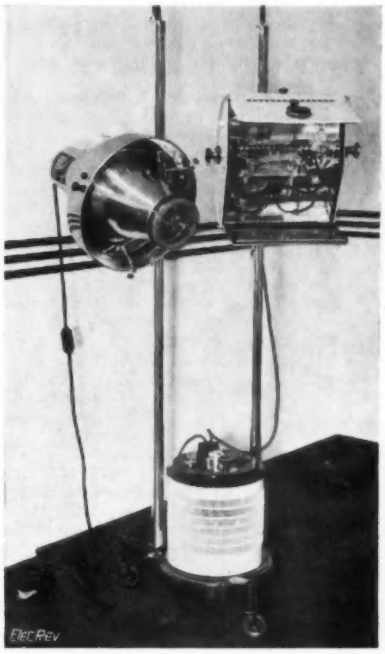


A Magrini rapid griller (left) and "browner-off" radiator (right)

Messrs. Sumerling & Co., Ltd., while the Kent Dish Washing Machine Co., Ltd., has several of its models on view. The Avamore Engineering Co., Ltd., offers a bread buttering and slicing machine and meat slicers with the motor hidden in the base; also potato peelers, food mixers, emulsifiers, a coffee grinder, a knife cleaning machine, a motor-driven dish washer, and heated food trolleys, different types and sizes of which are also on the stand of Hotlock, Ltd.,

Messrs. Mabbott & Co., Ltd., show a potato peeler, as also does the Staines Kitchen Equipment Co., Ltd., besides a silver burnishing machine and crockery washing sinks with motor drives. The Dairy Supply Co., Ltd., shows a motor-driven milk pasteurising and cooling plant, while United Water Softeners, Ltd., exhibit automatic electrically operated plant for the treatment of water.

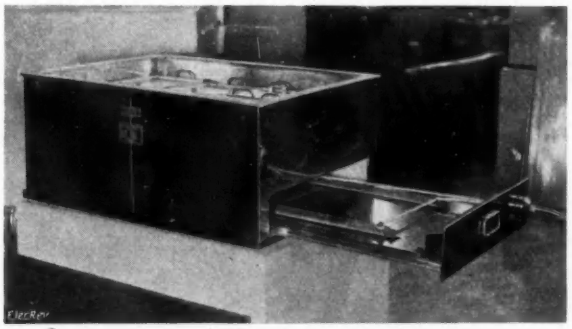
Two radiant-heat lamps are on the stand of Messrs. W. J. Wilson & Co., Ltd., while Hanovia, Ltd., makes actino-therapy equipment, including a "Duo" unit, which embodies two lamps operated from a single connection but with separate control and adjustment, one being a mercury-vapour lamp and the other an infra-red radiator luminous filament bulb.



A Hanovia dual health lamp outfit

G. B. Equipments, Ltd., displays Gaumont-British miniature sound-film cinema apparatus. Portable talking cinema equipment is also shown by Film Industries, Ltd., besides microphones, amplifiers and loud speakers. The Autocar Electrical Equipment Co., Ltd., offers Marconiphone speech and gramophone amplifying and reproducing outfits. Messrs. Gowshall, Ltd., have illuminated street guard posts. Messrs. Taylor Bros. (Sandiacre), Ltd., also supply illuminated guard posts and a variety of traffic signs. A dry battery operated flasher for street crossings is on the stand of Messrs. Wallace & Tiernan, Ltd.

The Pulsometer Engineering Co., Ltd., includes two motor-driven pumps in its exhibit. The Lea Recorder Co., Ltd., has a direct acting electrically operated integrator for notches, weirs and flumes with electrical transmitting apparatus. The Electroflo Meters Co., Ltd., and Geo. Kent, Ltd., display samples of indicating, recording and measuring instruments.



A Hotlock hot food conveyor trolley, showing the element tray withdrawn

# Electricity in a Modern Garage

THE Cumberland garage and car park near the Marble Arch, which is under the auspices of Normand Garage, Ltd., was officially opened on Monday by Mr. L. Hore-Belisha, Minister of Transport. It contains over 1,000 lighting points, sixty electric motors, 200 plug points, staff-call signals, impulse clocks, time-stampers, time-recorders, traffic-signals, and numerous signs, while over thirty-three miles of cable and 50,000 ft. of conduit have been used. The installed load is approximately 140 kW.

The "up" and "down" ramps have two entirely separate and independent lighting installations, "pilot" and "general," every alternate point belonging to one or the other system. On each half-floor level are grouped two-way and intermediate switches and indicator lamps enclosed in metal cases. The switching is such that on the "up" ramp it is possible at any floor to switch on the lights on either or both systems on that floor and all floors above, and in the case of the "down" ramp to control the lights on that floor and all floors below. Indicator lights show whether switches are on or off. Duplicate sets of switches and indicators enable the attendant to keep careful control over all ramp lighting and many of the parking lights are controlled in groups by means of cord switches in the ceiling.

In order to obviate the risk of damaging luggage fixed on car roofs, a light ray is thrown across the "up" ramp and when this is intercepted an "Osram" photo-electric cell and amplifier energise a relay, operate a warning bell and illuminate three red traffic lamps. A staff call system involving the use of over fifty coloured lamps throughout the building has been installed, while numerous neon and other signs have been fixed outside and adjacent to the garage, which can be individually controlled, or, by means of an automatic circuit-breaker, the whole can be switched on or off together.

Two automatic push-button lifts serve all floors. Both lighting and power distribution boards are controlled by oil-immersed circuit-breakers. The supply is taken from the mains of the St. Marylebone Corporation at 415 V three-phase.

In the filling station are eight "Bowser" all-electric metering petrol pumps, sixteen "Bowser" oil dispensing units, and two "Bristol" air and water towers for tyre inflation and topping of radiators. In the service station are two "Bristol" air compressors, driven by 4.5-h.p. flameproof motors; a "Champion" sparking plug tester and cleaner; and an all-electric brake tester built by J. Bradbury & Co., Ltd., the four motors employed being flameproof. There are also two "Niagara" four-gun washing machines driven by 5-h.p. flameproof motors made by Laycock Engineering Co., Ltd.; a battery charging plant, 100 A, of the Newton Rotax constant potential charger type with a Westinghouse all-metal rectifier; an a.c. fuel pump tester and a Rotax Newton electric testing machine for checking all electrical work on a car; and two Sturtevant portable vacuum cleaning machines.

The clocks throughout are by the "Magneta" Company, a master clock being situated in the basement.

# Business and Industrial Notes

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures**

## E.D.A. Suggestions for Christmas

Electricity supply authorities will probably have received the November-December Sales and Publicity Programme of the British Electrical Development Association, but there must be many electrical dealers who are now preparing plans for special window and interior displays for Christmas to whom the suggestions contained in this programme will prove of interest and value. For those who require material for a complete window display, there is a choice of four designs, priced respectively at £4 9s. 3d., £4 11s. 3d., £7 5s. 2d., and £5 13s. 6d. The Association has aimed this year at designing displays on a direct selling appeal, and the brilliant colouring of these creates a "Christmassy" atmosphere which should arouse the interest of Christmas shoppers. With each display the Association has prepared a plan to help dealers in setting out their windows. In addition to the full displays the Association is offering, at moderate prices, separate display units for shop window or interior display, two examples of which are shown in the accompanying illustrations. These are made of strong plywood, and as they are collapsible they can be dismantled and packed away for future use or adapted for use after Christmas. Dealers who are preparing their own designs will find that these are excellent aids. An attractive folder in two colours has been prepared containing illustrations of appliances suitable for gifts, and there are also special Christmas posters, 30-in. by 20-in., printed in photogravure in two colours. Stereos are available for local Press advertising. The programme contains a reminder for those who have not yet ordered the E.D.A. calendar for 1935.

**Two examples of E.D.A. display units**

## Swedish Control of Electrical Materials

The reorganisation has taken place of the Swedish Institute for the Control of Electrical Materials. The statutes of the new body have been approved by the Government, which is expected to grant it State authority so that it will be able to veto the use of materials not approved by it. The interests concerned in the new company are the Swedish Electricity Association, the Industrial Electrical Association and the Fire Protection Association.

## Electrical Propaganda at Bradford

Examples of electric cookers and other electric domestic appliances have been placed in the entrance halls of three Bradford cinemas this week (November 19th to November 24th) by the Bradford Corporation Electricity Department. They form part of displays of goods by local trading concerns in connection with Display Week at local cinemas controlled by the Gaumont-British Film Corporation.

**One of the new showrooms of the Medical Supply Association, Ltd.**

## The Machine Tool Exhibition

Reverting to our recent article on the Machine Tool Exhibition now being held at Olympia we are informed that among the stands on which motors made by Lancashire Dynamo & Crypto, Ltd., are to be seen, are those of Messrs. Noble & Lund, H. W. Kearn, Craven Brothers, Dowding & Doll, Geo. Angus & Co., Brayshaw Furnaces, and Geo. Jackman. About seventy motors of this company's make are in use at the show, ranging from 1 to 35 b.h.p.; both d.c. and a.c. types are represented. In some cases the squirrel-cage machines are of the "Fankuld" construction and there are also one or two geared motor units.

## Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry announces that there will be no "cost-of-living" alteration in wages paid in the industry on the third pay-day in December.

## Medical Apparatus Showrooms

New showrooms, providing a comprehensive display of electro-therapy, surgical and other requisites in London's "medical centre," have been opened at 95, Wimpole Street, W.1, by the Medical Supply Association, Ltd. Much of the electrical apparatus shown has been developed by the company itself and embodies the most advanced principles. An interesting lamp for local ultra-violet-ray irradiation is self-starting and gives a first-rate sunburn in 1½ minutes, the loading being 10 W. A special type of inhalation unit, operated by a small electric motor, emits a spray which, though almost invisible, penetrates to the lungs. "Warmglow" blankets are designed to be quite pliable; they were mentioned in our last issue (p. 685). Electrical sterilisers, claimed to be thoroughly reliable in service, are shown in a wide range of sizes. A new speciality of the company is an X-ray apparatus which is guaranteed to be shock-proof. A lower showroom is reserved for the new Westinghouse X-ray equipment, for which the company is sole agent in this country. Comfortable fitting and store rooms are included in the accommodation. The company's showroom space, excluding branches, now amounts to approximately 40,000 sq. ft.

## Labour Management

The Institute of Labour Management, which was formed in 1913, celebrated its coming-of-age by a dinner which was held on November 16th at Park Lane Hotel, W., the guest of honour being the Duke of Kent. In proposing the health of the Duke, Lord Trent, who presided, said that the Institute had come of age when more attention was being given to the human side of industry than ever before. On all sides they saw efforts being made to put the machine in its place as the servant of man, and to employ it for the enrichment of human life. The Institute of Labour Management had played a valuable part in this task by setting a high standard of character and ability in the art of management. The effectiveness of its work had been enhanced by its co-operation with the Home Office. The Duke of Kent, in proposing the toast

of the Institute, said that in twenty-one years the membership had increased from twenty to about 500. The successful carrying on of modern industry was dependent on goodwill and good feeling between employers and employed, and the Institute in its position as welfare supervisors and labour managers had unlimited opportunities to influence that good feeling. Mr. J. H. Fullwood, president of the Institute, who responded, said that its members had all adopted a commonsense attitude to industrial problems. Industry could only stand sound ideas. Other speakers were Mr. B. S. Rowntree, Miss E. D. Newcomb, Sir Thomas Barlow, and Messrs. D. R. Wilson, F. W. Leggett, and F. W. Lawe.

## Domestic Electrical Appliances in Austria

The Union of Austrian Electricity Supply Stations has recently completed an inquiry into the use of domestic electrical appliances in Austria. Although it extended to only about 56 per cent. of the country's population it showed that there were in use at the end of 1933 3,033 electric cookers, 1,796 electric hot plates, 328 fires and radiators, and 60 large electric cooking installations. The total capacity of the appliances amounted to 28,134 kW, an increase of 35 per cent. over 1932; the electrical energy consumed by the appliances is given as 8,599,677 kWh during the year, this being an advance of 73 per cent. over the preceding year. Electrical appliances are mostly used in the Vorarlberg area. Owing to the low price of gas, electric cookers are not popular in Vienna, which, with a population of 1,880,000, has only 218 electric cookers. In addition to the foregoing, there were 8,356 electric water heaters in use in Austria, these representing a gross load of 13,600 kW and an annual consumption of over 19,000,000 kWh.

## New "Northmet" Showrooms

Further showrooms were opened last week by the North Metropolitan Electric Power Supply Co., at Enfield and St. Albans. Showrooms were first opened in Church Road, Enfield, in 1914, but these have proved inadequate, and the new showrooms, situated in the same thoroughfare, were formally inaugurated by Coun. G. E. Jones, chairman of the Enfield U.D.C. on November 14th. The new building comprises three floors, the main showroom being on the ground floor where there is also a demonstration kitchen and stores. On the first floor there is a workshop where repairs are made to consumers' apparatus, the remainder of this floor and the whole of the second floor providing accommodation for the "Northmet" staff.

The new showrooms at St. Albans opened by Coun. W. Bird, also replace existing showrooms which have proved too small to cope with the increasing business. The new showrooms are of particular interest as the building, Ivy House, is an 18th century mansion, which has been altered as little as possible in the process of conversion. The building, therefore, not only retains its old-world charm, but enables consumers to see the various electrical apparatus in appropriate settings. The entrance hall has a room on either side which will be used as showrooms for displaying electrical fittings. On the first floor there is a lounge, leading from which is a demonstration kitchen. In the basement are stores, while in an extension at the rear of the building there is an up-to-date workshop for repairs and a display window.

## A Centenary

To commemorate the completion of the first one hundred years of their business, Messrs. George Cohen, Sons & Co., Ltd., of 600, Commercial Road, London, E.14, have published a very fine volume of between 200 and 300 pages in which the story of the concern and its various activities to-day is told. It contains a large number of excellently produced portraits of the founders and their successors who built up the business, also of the officers and staff in charge of its many branches, as well as numerous photographs of its various works, depôts, and of equipment which has passed through its hands, or for which it has been responsible, at various stages in its long history.

## Recent Contract

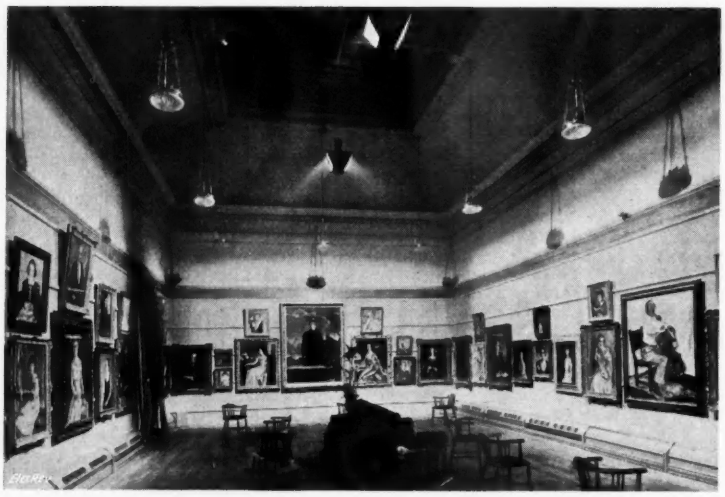
In order that music may be available for the staff during meal times and for dancing during such times as the canteen is reserved for such a purpose, Messrs. Steel, Peech & Tozer, Ltd., have just installed sound reproduction equipment in the staff canteen of their steel works at Sheffield. The amplifying equipment, manufactured by the General Electric Co., Ltd., and supplied through its Sheffield branch, is of the 12-W a.c. rack type. In addition to one of this season's G.E.C. radio receivers of the five-valve a.v.c. superhet type, which has been incorporated in the amplifying rack, for the reception of suitable radio items, an automatic record-changing gramophone table has been installed for the reproduction of records.

## Employment During October

Employment in the engineering industry during October showed little change in most sections as compared with September, and remained slack on the whole. According to statistics published in the *Ministry of Labour Gazette*, the number of unemployed in the engineering industry totalled 126,806, a decrease of 6,320 as compared with the preceding month, the percentage falling from 13.8 to 13.2 (in October, 1933, the figure was 19.9 per cent.). In the electrical engineering section there was little change, the number of unemployed being 6,271, as against 6,282 in September. In the electric cable, apparatus and lamp manufacturing group there was a

**Two new showrooms opened last week by the North Metropolitan Electric Power Supply Co. Above, The Enfield premises. Below, "Ivy House," St. Albans**

slight increase from 9,365 to 9,678, the percentage rising from 7.0 to 7.3 (9.5 in October, 1933). Unemployment in the electrical wiring and contracting industry decreased from 4,943 to 4,423, the percentage being 13.3 against 14.8 in September (15.6 in October, 1933). The percentages for September have been revised since the figures for that month were published.



**The Royal Institute Galleries showing the special G.E.C. lighting fittings which have recently been installed**

## Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances.

| CHEMICALS, ETC. | Price, November 21st. | Fortnight's Inc. or Dec. |
|---|---|---|
| *a* Acid, Oxalic ... ... ... ... per cwt. | 50s. | — |
| *a* Ammoniac, Sal ... ... ... per ton | £40 | — |
| *a* Ammonia, Muriate (large crystal) ... ,, | £38 | — |
| *a* Borax ... ... ... ... ... ,, | £17 | — |
| *a* Copper, Sulphate ... ... ... ,, | £19 15s. | — |
| *a* Potash, Chlorate ... ... ... per lb. | 3¾d. to 4¼d. | — |
| *a* ,, Perchlorate ... ... ... ,, | 6d. | — |
| *a* Shellac T.N. ... ... ... per cwt. | £4 18s. | — |
| *a* Sulphur Commercial... ... ... per ton | £11 | — |
| *a* ,, Roll ... ... ... ... ,, | £11 | — |
| *a* Soda Chlorate ... ... ... per lb. | 3¼d. to 3⅝d. | — |
| *a* ,, Crystals... ... ... per ton | £5 to £5 5s. | — |
| *a* Sodium Bichromate, casks ... ... per lb. | 4d. net. | — |
| **METALS, ETC.** | | |
| *b* Aluminium, Ingots ... ... ... per ton | £100 to £105 | — |
| *b* ,, Wire ... ... ... per lb. | 1/1 to 1/9 | — |
| *b* ,, Sheet and Foil... ... ... ,, | 1/2 to 2/9 | — |
| *p* Babbits Metal and Anti friction Metals— | | |
| Grade I ... ... ... per ton net | £206 | — |
| Grade II ... ... ... ... ,, | £141 | — |
| Grade III ... ... ... ... ,, | £69 | — |
| *c* Brass (rolled metal 2" to 12" basis)... per lb. | 6⅝d. | — |
| *c* ,, Tubes (solid drawn) ... ... ,, | 8¼d. to 9d. | — |
| *c* ,, Wire, basis ... ... ... ,, | 7¼d. | — |
| *c* Copper Tubes (solid drawn)... ... ,, | 9¼d. | — |
| *g* ,, Bars (best selected)... ... per ton | £58 | — |
| *g* ,, Sheet ... ... ... ... ,, | | |
| *g* ,, Rod ... ... ... ... ,, | | |
| *d* ,, (Electrolytic) Bars ... ... ,, | £30 10s. | — |
| *g* ,, ,, Sheets ... ,, | £30 10s. to £30 12s. 6d. | — |
| *d* ,, ,, Wire Rods ... ,, | £35 10s. | — |
| *d* ,, ,, H.C. Wire ... per lb. | 6¼d. | — |
| *f* Ebonite Rod ... ... ... ... ,, | 1/6 to 2/– plus | — |
| ,, Sheet ... ... ... ,, | 1/3 to 1/6 } 10% | — |
| *n* German Silver Wire ... ... ... ,, | 2/5 | — |
| *h* Gutta-percha, fine ... ... ... ,, | nom. | — |
| *h* India-rubber, Para fine ... ... ,, | 5¼d. | — |
| *i* Iron, Pig (Cleveland No. 3) ... per ton | 62/6 | — |
| *i* ,, Wire galv. No. 1, P.O. qual. ... ,, | £20 | — |
| *g* Lead, English Pig ... ... ... ,, | £12 10s. | — |
| *g* Mercury ... ... ... ... per bot. | £11/12/6 to £11/15 | — |
| *c* Mica (in original cases) small ... per lb. | 6d. to 3/6 | — |
| *e* ,, ,, medium ... ,, | 4/- to 8/- | — |
| *e* ,, ,, large ... ,, | 8/6 to 17/6 & up | — |
| *p* Phosphor Bronze, plain castings ... ,, | 1/1 | — |
| *p* ,, ,, drawn bars & rods ,, | 10¾d. | — |
| *p* ,, ,, rolled strip & Sheet ,, | 10¾d. | — |
| *p* ,, ,, wire ... ... ,, | 11¼d. | — |
| *o* Platinum ... ... ... ... per oz. | £7 15s. | — |
| *d* Silicium Bronze Wire ... ... per lb. | 7 7/8d. | — |
| *r* Steel, magnet, in bars ... ... ,, | 7¾d. | — |
| *g* Tin, Block (English) ... ... per ton | £228 15s. to £230 15s. | — |
| *n* ,, Wire, Nos. 1 to 16 ... ... per lb. | 3/8 | — |

Quotations supplied by :—

*a* G. Boor & Co.
*b* The British Aluminium Co., Ltd.
*c* Thos. Bolton & Sons, Ltd.
*d* Frederick Smith & Co.
*e* F. Wiggins & Sons.
*f* India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
*g* James & Shakespeare.
*h* Edward Till & Co.
*i* Bolling & Lowe.
*l* Richard Johnson & Nephew Ltd.
*n* P. Ormiston & Sons.
*o* Johnson Matthey & Co.
*p* C. Clifford & Sons, Ltd.
*r* W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

## Art Gallery Lighting

The Royal Society of Portrait Painters' Exhibition was opened on Saturday last at the Royal Institute Galleries, Piccadilly, W. Our picture shows the new form of art gallery lighting by the General Electric Co., Ltd., which has recently been installed throughout these galleries.

## Social Events

Mr. W. F. Bishop, managing director, presided at the annual dinner of the staffs of W. T. Henley's Telegraph Works Co., Ltd., and Henley's Tyre & Rubber Co., Ltd., at the Great Central Hotel, N.W.1, on Saturday last. After dinner and the loyal toast, Mr. B. C. Wilkins (accountant) proposed the toast of W. T. Henley's Telegraph Works Co. He pointed out that the "Company" was not just the shareholders and directors but also the staff and workpeople whose aim it was to make the concern a prosperous one. The speaker referred to the company's three "children"—Henley's (S.A.) Telegraph Works Co., Ltd., the Tyre & Rubber Co., and the Holborn Construction Co., the last of which had secured a number of good contracts. Mr. Wilkins paid a tribute to the memory of the late Sir George Sutton and mentioned that there had been no serious labour dispute in the works for many years. The toast of the Tyre Company was proposed by Mr. W. G. Smale, who said that although that company had had its troubles there were better times ahead. Response to both toasts was made by Mr. Bishop, who mentioned that that afternoon a white marble bust of Sir George Sutton, by a leading sculptor, had been placed in the vestibule of the head office. (A picture of this appears on page 735 of this issue.) He extended a welcome to Mr. W. McClelland, who had recently joined the board; his experience as Director of Electrical Engineering at the Admiralty would be of great value to the company.

Sir Montague Hughman, chairman of Henley's, then presented the City Livery Cup, which had been won by the Gravesend works of the company, to Mr. R. O. Wright (Gravesend works manager), who expressed his works' determination to win it again. Sir Montague then gave the toast of the chairman, and Mr. Bishop briefly responded. Mr. H. Stanley was again in fine voice as toastmaster. After the speeches there was dancing in the Winter Garden of the hotel.

Messrs. R. A. Lister & Co., Ltd., are holding their annual dinner on December 12th at the Café Royal. Mr. P. Lister, managing director, will preside, and Mr. W. Elliot, M.P., Minister of Agriculture, will be the chief guest. After the dinner the entire party will attend the Strand Theatre.

## The Lighting of Wakefield Cathedral

Wakefield Cathedral has recently been renovated and redecorated, and the work has included a new lighting installation. The scheme was prepared by the Technical Department of Holophane, Ltd., in conjunction with Mr. White, of the Wakefield Corporation Electricity Department, and was carried out by Messrs. Walter Robb, Ltd. The concealed lighting units were placed in the top of the window recesses to meet the requirements of artificial light coming from the same direction as daylight. Special 200-W interior projectors were used with bowl sprayed lamps, at a height of 30 ft., giving good uniform lighting. The chancel and the chapel behind the high altar are illuminated by similar concealed projectors, but at a height of about 45 ft.

**Wakefield Cathedral illuminated by means of Holophane projectors**

## Electric Heating of Buildings

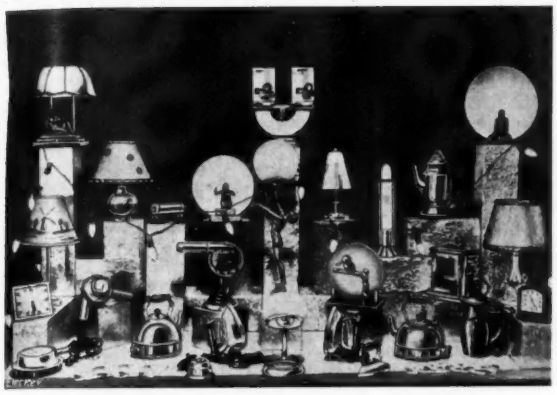
The second Sales Conference of the winter session of the Mid-East England Area of E.D.A. was held in Leeds on November 14th, when a lecture was delivered by Mr. T. Illingworth, of Barker, Young & Co., Ltd., entitled "The Warming of Buildings by Electricity." The lecture dealt briefly with the various methods of heating buildings by electricity. Compara-

tive costs of heating by electricity and other methods were given, and those present expressed the wish that the figures should be tabulated and circulated to each undertaking in the area. At the close of the lecture lantern slides were shown of various electric heating installation in houses, offices, churches, &c., and a discussion followed. A vote of thanks to the lecturer was moved by Mr. A. E. Elson (Halifax), seconded by Mr. R. M. Longman (C.E.B.). Mr. C. E. Allsopp presided, and about fifty engineers and contractors were present.

## Winding-up Petition

In the Companies Court on November 19th Mr. Justice Eve had before him a petition for the compulsory winding up of Telsen Electric Co., Ltd.

Mr. Buckmaster said this was a creditor's petition for £1,291 for goods sold and delivered. Mr. Turner said he appeared for the company and for opposing creditors for £16,000. Mr. Wynn Parry appeared for opposing creditors for £7,000. It was stated that the company was desirous of formulating a scheme. In answer to his Lordship, Mr. Buckmaster said that the company's business was the manufacture of wireless sets and transformers for wireless apparatus. Mr. Turner said the



**A display of Christmas gifts which has been arranged at the showrooms of Messrs. Falk, Stadelmann & Co., Ltd.**

concern was a substantial one; he asked for an adjournment for fourteen days in order that the company might meet its creditors.

His Lordship directed the matter to stand over for fourteen days.

## Capital Reduction

Mr. Justice Eve, in the Chancery Division on November 19th, sanctioned a scheme of arrangement between British Ropes, Ltd., and its shareholders, and made an order for the reduction of its capital from £5,000,000 to £3,411,137 10s.

## Trade Announcements

The Manchester branch of Archibald Low Electrics, Ltd., has been removed to 27, Bridge Street (telephone: Blackfriars 3824).

Aidas Electric, Ltd., has removed to Sadia Works, Park Avenue, North Circular Road, N.W.10.

Messrs. Drake & Gorham, Ltd., have removed their Hereford branch to 13, Wilson's Chambers, Commercial Street, Hereford.

## New Catalogues and Lists

**Michael Black, Ltd.,** 80, Blythswood Street, Glasgow, C.2.—A new season's radio catalogue.

**Saxonia Electrical Wire Co., Ltd.,** Roan Works, Greenwich.—Tables of useful data on wire for those connected with the electrical industry.

**James Neill & Co. (Sheffield), Ltd.,** Composite Steel Works, Napier Street, Sheffield, 11.—A brochure on the "Eclipse" portable magnetic chuck.

**The Carborundum Co., Ltd.,** Trafford Park, Manchester.—A booklet entitled "Carborundum at the Machine Tool and Engineering Exhibition."

**P. Higson & Co.,** River Street, Bolton.—A leaflet on the "Eeto" heat-conserving cylinder jacket.

**Harcourts, Ltd.,** 21a, Newman Street, W.1.—A catalogue of 1935 lighting fittings.

**Watliff Company, Ltd.,** Commutator Works, Morden Road, South Wimbledon, S.W.19.—A list of commutators, slip rings, &c.

**Lacy Hulbert & Co., Ltd.,** 91, Victoria Street, S.W.1.—A list of ball-bearing air compressors.

**Oldham & Sons, Ltd.,** Denton, Manchester.—A catalogue of c.i. bus batteries.

**Sun Electrical Co., Ltd.,** 118, Charing Cross Road, W.C.2.—A supplementary catalogue of modern electric clocks and a new list of lighting fittings.

**Cambridge Instrument Co., Ltd.,** 45, Grosvenor Place, S.W.1.—A catalogue of pressure and draught indicators and recorders.

**General Radiological & Surgical Apparatus Co., Ltd.,** 204, Great Portland Street, W.1.—A number of catalogues on new equipment for electro-medical work.

**Ferranti, Ltd.,** Hollinwood.—A card suggesting clocks for Christmas presents.

**Findlay & Co.,** Broadway Chambers, Hammersmith, W.6.—A catalogue of stop watches, chronographs, &c.

**Bulpitt & Sons, Ltd.,** Swansea Works, Birmingham, 1.—A leaflet containing Christmas gift suggestions.

## Bankruptcy Proceedings

**F. S. S. Wates,** wireless set manufacturer and salesman, lately of 184-188, Shaftesbury Avenue, W.C.—The public examination of this debtor was held on Tuesday at the London Bankruptcy Court, the accounts showing liabilities of £1,275 and assets of £60. The debtor stated that in 1919 he began business on his own account as "Wates Bros.," dealing in wireless equipment and accumulators. Later he converted the business into "Wates Bros., Ltd.," and he and his wife became directors. As vendor he received £4,998 in shares, of which he gave £2,998 to his wife. The company went into voluntary liquidation in September, 1926. He subsequently produced wet high-tension batteries and traded both with his wife and alone at various addresses, latterly at Shaftesbury Avenue, under the style of the "Standard Battery Co." As the scope of the business had extended further capital was required and in September, 1932, "Wates Radio, Ltd.," was formed and acquired the business for £2,000 in shares. He acted as director at a salary of £900, eventually reduced to £450 a year, but excessive delay in the production of a certain radio set, exhausted the company's capital and a voluntary winding-up followed in July, 1933. The debtor attributed his insolvency to the failure of the beforementioned companies. The examination was concluded.

**E. W. Barge,** electrician, 2, Oxford Road, Bournemouth.—Receiving order made November 12th on a creditor's petition. First meeting November 24th at 10, Rockstone Place, Southampton. Public examination November 27th at the Law Courts, Bournemouth.

**A. W. Tack** (Ensbury Electrical Supplies), electrical and radio retailer, 119, Columbia Road, Bournemouth.—Last day for receiving proofs for dividend November 30th. Trustee, Mr. C. J. Pyke, 10, Rockstone Place, Southampton, Official Receiver.

**W. C. Loft,** electrical dealer, Unity House, Dartford Road, Dartford.—Public examination December 10th at the Court House, Eastgate, Rochester.

## Company Liquidations

**Unity Lamp and Accessories, Ltd.,** 41, Call Lane, Leeds.—The Statutory meeting of creditors was held on November 15th at the Institute of Chartered Accountants, Moorgate Place, E.C., when Mr. E. W. Leek, one of the directors of the company, presided. A statement of affairs was submitted showing liabilities of £7,407, of which £5,892 was due to unsecured creditors, and there were loans on debentures for £1,515. The net assets were £5,374, leaving a deficiency of £2,033. The company was formed in October, 1924, for the purpose of carrying on business as electrical factors at Birmingham, with an authorised capital of £2,000, which was increased to £4,500 in 1926. Of that capital £3,500 was issued and held by the directors of the company. Two years after formation a branch was opened at Leeds. During the first two years' trading losses were incurred at Birmingham, but the trading for the first half-year at Leeds showed a profit of £600. During the following six years net profits were made, but they were insufficient to wipe out the losses made during the first two years. The debenture holders appointed Mr. S. H. Swallow as receiver on October 26th last; he had also been nominated to act as liquidator of the company. The chairman said that one of the largest creditors had suggested that the debenture holders should waive their preferential rights and rank as ordinary unsecured creditors. The debenture holders had agreed to that course, thereby providing a dividend for the unsecured creditors of approximately 14s. 6d. in the £, subject to the costs of liquidation. The creditors passed a resolution confirming the voluntary liquidation of the company with Mr. Swallow as liquidator. The following are creditors:—Armorduct Cable Co., Ltd., £594; Blackwell & Co., Ltd., £104; British Driver Harris Co., £122; Ever Ready Co., Ltd., £104; Falk, Stadelmann & Co., Ltd., £129; Fitter & Poulton, Ltd., £108; Kersons Manfg. Co., £400; Cmmdr. Leek, £682; C. H. Parsons, Ltd., £198; Prentice, Ltd., £242; Stella Lamp Co., £628; Strong & Co., £130.

**A. S. Plater & Co., Ltd.,** electrical engineers, High Street, Wood Green.—The first meetings of the creditors and shareholders under the compulsory liquidation of this company were held on November 15th at Carey Street, W.C. The company was registered in October, 1932, to carry on business as electrical engineers and general electrical installation contractors. Mr. A. S. Plater had carried on business for several years as A. S. Plater & Co. and having incurred a serious financial loss as the result of a contract, he decided to convert the business into a limited liability company in order to obtain the protection against personal liability afforded by the Companies Act. The purchase price paid by the company was £1,450 by cheque, which was exchanged for 1,500 shares of the company. The business consisted of the execution of contracts for electrical installations and repairs. Mr. Plater attributes the company's failure to loss in connection with Harringay Olympia, Ltd., and to general depression in the electrical trade. The liquidation was left in the hands of the Official Receiver.

**George Nobbs, Ltd.,** 87/9, Cleveland Street, W.1, electrical appliance makers.—The statutory meeting of creditors was held recently in London, when a statement of affairs was submitted showing liabilities to unsecured creditors of £3,180. The net assets were £3, leaving a deficiency of £3,177. It was reported that the debenture holders had appointed Mr. C. Waller, 27, Fitzroy Square, W.1, as receiver. The company was formed in 1920 with a capital of £5,000. The company had sustained losses on trading each year, with the exception of 1925 and 1929 when profits were returned. A debenture for £500 was issued in October, 1932. A resolution was passed confirming the voluntary liquidation of the company with Mr. C. Waller as liquidator. A committee of inspection was also appointed consisting of the representatives of Messrs. Howard & Hill, Ltd., R. McLaren & Co., Ltd., and the Manor Electric Co., Ltd.

**Hurley, Edwards & Thomas, Ltd.**—Winding up voluntarily. Liquidator, Mr. C. W. Griffin, 110, Bute Street, Cardiff.

**Crewe & Suburban Electrical Services, Ltd.**—Winding up voluntarily. Liquidator, Mr. J. A. Cropper, 4, Hope Street, Sandbach.

**Pollopas, Ltd.**—Winding up voluntarily. Liquidator, Mr. T. G. Foster, 1, Oxford Street, Nottingham.

# Electricity Supply

## Lighting, Domestic, Power

**Aberdare.**—NEW TARIFF.—The following new tariff is to be introduced for consumers taking e.h.v. supplies: First 50,000 kWh per quarter, 1d. per kWh; second 50,000, 0.95d.; third 50,000, 0.90d.; fourth 50,000, 0.85d.; above 200,000 kWh, 0.80d. per kWh.

APPARATUS FOR HIRE.—Application is to be made for sanction to a loan of £2,000 for the purchase of electrical appliances to be sold in the Council's proposed showrooms.

**Australia.**—A SYDNEY ELECTRICITY ADVERTISEMENT.—An effective advertisement of the Sydney municipal electricity department has appeared in the local papers. It occupies a full page and contains the exhortation in bold type: "In your home be a manager, not a labourer." There are numerous illustrations of electrical appliances in common use, and the accompanying text sets out in tabulated form what a penny will do. It will, to mention one or two instances, boil twelve pints of water, do four hours' cleaning, toast thirty slices of bread, and so on.

**Bedford.**—EXTENSIONS.—The Beds, Cambs & Hunts Electricity Co. is to extend overhead and underground lines at Windmill Hill, Eaton Ford.

**Bradfield.**—OVERHEAD LINES.—The Wessex Electricity Co. proposes to erect overhead lines on Ashampstead Green.

**Bridgend (Glam).**—INQUIRY.—An account for 400 guineas has been received by the Urban District Council from Major I. E. David and Professor George Knox, who recently conducted an independent investigation into the affairs of the Council's electricity undertaking. In their joint report the experts stated that they had found no evidence of corruption or bribery against any of the members or officials, and outlined a reorganisation scheme that would entail the appointment of a number of extra officials. The inquiry took place as the result of local agitation, and extended over several months.

**Canada.**—HYDRO-ELECTRIC POWER DEVELOPMENT.—The *Financial Times* (Montreal) states that construction work has been active this year at hydro-electric undertakings in various parts of Canada. The Shawinigan Water & Power Co. has completed and brought into operation the initial stage of its Rapide Blanc development on the St. Maurice River, at which four units of 40,000 h.p. each have been installed, making a total of 160,000 h.p. The Beauharnois Light, Heat & Power Co. is proceeding with the additions to plant at Beauharnois, where a 50,000 h.p. unit was brought into operation on October 1st. Another of the same capacity will be completed by the end of the year, bringing the installed capacity to 300,000 h.p. Other works include the reconstruction by the Dominion Department of Public Works of the Quebec portion of the Temiskaming dam. The Ontario Hydro-Electric Power Commission has under construction a 1,200 h.p. development on the Albany River, and the town of Orillia is developing a 4,600 h.p. plant on the Gull River.

ELECTRICITY GENERATION.—Canadian central electricity stations generated in September a total of 1,597,283 million kWh, a decline of 33,501 million kWh as compared with the August figure.

**Cornwall.**—DEVELOPMENT OF ROSELAND AREA.—An address on the proposed electrification of the Roseland district of Cornwall was given by Mr. E. Todd, representing the West Cornwall Electricity Supply Co., Ltd., at a meeting last week of representatives of Roseland local authorities. Mr. Todd said it cost his company about £45,000 to open up the grid at Fraddon for the supply to Central Cornwall, and it would cost between £10,000 and £11,000 to extend the supply to St. Mawes, St. Just-in-Roseland, Veryan, Portscatho, and other villages in the Roseland area.

**Promenade lighting at Douglas (I.O.M.) by 180 "Leeds" lanterns fitted with 500-W lamps mounted on "Cardiff" pole top inverted brackets. The installation was designed and carried out by Mr. Bertram Kelly, in conjunction with the Edison Swan Electric Co., Ltd.**

**Crewe.**—REDUCED CHARGES.—The Town Council has adopted a two-part tariff with a fixed charge of 4s. per quarter per assessable room, plus a "unit" charge of ¾d. for lighting or domestic purposes.

**Dundee.**—SUB-STATIONS.—The Corporation is erecting sub-stations at Muirfield Road, Navarre Street, and Queen Street, Broughty Ferry.

**Ealing.**—BATTERY-CHARGING TARIFF.—The Electricity Committee recommends that a charge of ¾d. per kWh be made for the supply of current for charging batteries of electric vehicles between the hours of 9 p.m. and 8 a.m., provided a synchronous-motor type of time switch, suitable for sealing off by the Department, is installed at the cost of the consumer.

SUB-STATION.—The Electricity Committee is seeking sanction to borrow £10,000 for sub-station equipment.

**Germany.**—HYDRO-ELECTRIC STATION ON THE RHINE.—A further step in the work of harnessing the water power of the Rhine was recently completed by the putting into operation of the Albbruck-Dogern power station. The plant utilises the 7½ miles of the river from the Koblenz-Waldshut railway bridge down to Schwaderloch-Albbruck. There are three generating sets, which are designed for an output of 32,500 kVA (10,500 V, 50 cycles) at 75 r.p.m. The generators were built by the Brown, Boveri Co., and the turbines are of Escher Wyss manufacture.

**Girvan (Ayrshire).**—CABLES.—The Ayrshire Electricity Board proposes to lay cables to a new housing estate at Bourtreehall.

**Glasgow.**—MAINS EXTENSIONS.—The Electricity Committee has agreed that distributing mains be laid at a cost of £12,177.

**Hereford.**—EXTENSIONS PROMISED.—The Shropshire, Worcestershire & Staffordshire Electric Power Co. has promised to carry out a number of extensions during the next two years.

**Hyde.**—ELECTRIC PUMPS.—The Sewage Committee is to obtain tenders for the provision of electric pumps at the sewage works.

**Isle of Man.**—REDUCED CHARGES.—Mr. J. P. Tucker, engineer and secretary to the Isle of Man Electricity Board, has sent us particulars of the revised charges operating as from October 1st. The two-part tariff retains a kWh charge of 1d., but there are reductions in the fixed charge varying from 5s. on 500 sq. ft. (now £2 per annum) to £3 15s. on 5,000 sq. ft. (now £12 10s). To all domestic consumers cooking wholly by electricity an amount equal to 15 per cent. of the total charges for electricity consumed in the quarter for which the account is rendered will be credited to the next account, provided payment is prompt. A lighting maximum demand tariff for shops, offices, hotels, &c., has again been introduced, and there are reductions in the flat rate for power, and service charges; there is a new block tariff for motive power.

**Kenfig Hill (Glam).**—PROTEST AGAINST CHARGES.—As a protest against the price charged for electricity in the district, the shopkeepers have agreed to revert to the use of oil lighting on their premises.

**Llanelly.**—SELF-CONTAINED LIGHTING PLANT?—A scheme has been placed before the Markets Committee for the lighting of the Market by a self-contained generating plant in the Old Armoury at a cost of £3,020. In outlining the scheme, the borough surveyor said that the cost of electricity would be 3.59d. per kWh instead of 5.62d., as is paid to the local electricity supply company now. The company has decided to offer reduced terms, and a further meeting will take place.

**Lowestoft.**—CHEAPER ELECTRICITY.—The charge for electricity for lighting has been reduced from 5½d. to 4¾d. per kWh, and for power from 1d. to 0.9d.

**Ludlow.**—NEW CABLES.—In order to cope with the increased demand for electricity in the Mill Street area, the Shropshire, Worcestershire & Staffordshire Electric Power Co. is making arrangements for the laying of new cables.

**Northern Ireland.**—PORTRUSH.—At a special meeting the Council had before it two proposals for the future of the municipal electrical undertaking. One suggested applying for sanction for a loan to carry on the undertaking as heretofore, generating and distributing electricity. The other was in favour of selling the undertaking. The Council resolved to recommend to the ratepayers that the undertaking be improved in various ways and retained under its present control.

**Preston.**—OVERHEAD LINES.—The Rural District Council has consented to the Preston Corporation erecting overhead electricity lines at Ingol and New Longton.

**Ryhope.**—STREET LIGHTING.—The Council has decided to install electric-discharge lamps in several of the main streets.

**St. Albans.**—PROPOSED LOWER TARIFFS.—The North Metropolitan Electric Power Supply Co. proposes to make further reductions in electricity charges to take effect from accounts issued on and after December 1st.

**Scotland.**—GRAMPIAN SCHEME.—As a further stage in the Grampian hydro-electric scheme, construction is to start shortly on a tunnel between Loch Garry and Loch Ericht. The scheme will cost £250,000, and will take nearly three years to complete. The tunnel will pass through Ben Udlamain, Perthshire, which is 3,674 ft. high, and will carry the flood waters of Loch Garry and district into Loch Ericht. The contractors are Messrs. Balfour, Beattie & Co., London.

**Spalding.**—NEW TARIFF.—The Urban District Council has introduced additional tariffs for internal floodlighting at 5d. per kWh and for charging electric vehicles (8 p.m. to 8 a.m.) at ½d. per kWh.

MAINS EXTENSION.—The Council is to extend the mains to Moulton Sea's End, at an estimated cost of £2,500, on a guarantee of 20 per cent. of the capital cost over a period of three years.

**Sunderland.**—LOAN.—The Electricity Committee has decided to apply for sanction to borrow £15,000 for mains extensions.

**Swanage.**—STREET LIGHTING.—The Urban District Council is to invite tenders for the erection of twenty-seven new street lamps.

**Swanley.**—INQUIRY.—Lieut.-Col. F. Gordon Tucker held a Ministry of Transport inquiry on November 9th into the application of the West Kent Electric Co., Ltd., for permission to erect overhead lines between Hextable and Swanley. For the applicants it was stated that the area in question did not promise a reasonable return in revenue for underground cables. There was opposition on the part of the Dartford Rural District Council. The inspector remarked that during the building development of an area overhead lines did not seem to make much difference to the general appearance.

**Turkey.**—ELECTRICITY SUPPLY PROGRESS.—In a recent issue of the *Bulletin Quotidien*, of the French Société d'Etudes et d'Informations Economiques, particulars are given of the position of electricity supply in Turkey. Up to 1923, when the country became a republic, only Stamboul, Tarsous, Eski-Chehir and Ada-Pazar had an electricity supply. By the end of 1930 there were ninety-seven power stations in the country, of which thirteen were hydro-electric. The total output in that year amounted to 81,722,000 kWh. By the end of 1933 the total installed generating plant in the country had increased to roughly 120,000 kW and the number of stations to 109. The most important plants are those in Stamboul and Smyrna, with capacities of respectively 70,000 and 6,000 kW. Various new projects are under consideration, among them being a steam-operated station supplied with coal from the Zonguldak mines and two hydro-electric plants to utilise the power of the rivers Kizil-Irmak and Sakkaria in Anatolia.

**United States.**—ELECTRICITY CHARGES.—According to the *Manchester Guardian*, a great blow has been delivered at private electric power interests in the report just made public by President Roosevelt. The report is that of the New York State power authority and discusses the excessive cost of electricity in New York. The authority finds, after several years' careful investigation, that the rates charged for electricity are, on the average, about twice as much as they should be, and in some cases four times as much. The report is expected to help the project for the deep-water canal from the great lakes to the ocean, using the St. Lawrence River. This proposal involves vast hydro-electric power development, and it is assumed that if this cheap Government power were available private companies would reduce their rates to a point which would earn only reasonable profits on their investment.

**Whitby.**—CHANGE-OVER.—The Urban District Council has authorised the electrical engineer to proceed with the change-over in the Castle Park and Fishburn Park districts at an estimated cost of £695.

**Wimbledon.**—ANNUAL REPORT.—The chief engineer and manager of the electricity undertaking (Mr. A. E. McKenzie) has sent us the report for the year ended March 31st, 1934.

**Floodlighting a grass tennis court by Holophane type FL.500E fittings (one of which is shown inset). Ten 500-W units are used**

The amount of electricity sold increased by 17.17 per cent. over the previous year to 43,608,804 kWh, and is the highest yet recorded. Of this amount 45 per cent. was used for heating and cooking, 20.9 for general lighting, and 22.2 for power. It is interesting to note that the consumption per domestic consumer was 1,093 kWh, a remarkably high figure. The maximum demand rose from 16,600 kW to 18,260 kW. A supply of electricity is now given to 95 per cent. of the buildings in the area of supply. The Hiring Department records the most successful year since its inception, the following figures showing the number of appliances issued during the year, with the total on hire given in parentheses: cookers, 786 (5,109); wash-boilers, 279 (1,524); water heaters, 1,374 (3,952); irons, 477 (5,379); kettles, 698 (4,423); radiators, 1,158 (5,713). The increased water-heating load, it is stated, has been due to a large extent to recommendations of consumers who have proved its advantages.

**Wiveliscombe.**—EXTENSIONS.—The Wellington District Electricity Co., Ltd., proposes to carry out extensions in Jews Lane, Burges Lane and Hartswell.

# Electricity in the Irish Free State

ALTHOUGH abnormal costs, amounting to £75,000, were incurred owing to the drought, the report of the Electricity Supply Board, I.F.S., shows that the surplus for the twelve months ended March 31st last was over £10,000, as compared with less than £6,000 for the previous year. The revenue from sales of electricity improved from £1,045,000 to £1,150,000, the amount of energy sold increasing from 120 million to 139 million kWh at an average price of 1.99d. per kWh sold. Out of the working costs of £583,000, the sum paid for coal was £91,000.

The capital expended on the Board's undertakings amounts to £10,260,000, including £567,000 spent during the year. The Shannon works and ancillary transmission system account for £5,934,000 and the assets of acquired undertakings for £1,214,000. The capital charges of £577,000 were chiefly due to interest paid to the Ministry of Finance at 5¼ per cent.

Supply is now given to 196 districts, of which fourteen were added in the year under review. The latter contributed 813 consumers to the total increase of 7,402 consumers, bringing the aggregate to 89,890.

All the new industries that were started during the year have taken their supplies from the Board. Conversions to electric drives included flour mills and pumping installations, which, with various works, added 6,200 h.p. in motors. With that the total for motive power became 52,352 h.p. Several heating and cooking installations in institutions were connected, the largest being Our Lady of Lourdes Hospital, Dun Laoghaire (215 kW), which was described by Mr. R. N. Tweedy in our last issue. A 4,000-kW sub-station was completed to supply the light, heat, power and electro-medical requirements of the National Maternity Hospital, Dublin.

A steady expansion in the use of electric cooking and water heating is reported. The Board has introduced a hiring scheme for water heaters and increased its canvassing staff. The advice of the lighting service bureau is much in demand.

The installation at Ardnacrusha power station of a 25,000-kVA generator driven by a 38,000-h.p. Kaplan turbine was completed in November of last year. With the three existing Francis turbines the total capacity of the station is now 90,000 kW at a head of 28.81 metres. A new 23,000-kW steam turbo-alternator and two 125,000-lb. per hour boilers, which are expected to be ready for operation early in 1925, will make the capacity of Pigeon House station, Dublin, about 50,000 kW. Additional cooling and circulating water facilities are also to be provided there.

The energy generated at Ardnacrusha (103 million kWh) was less by 43 million kWh than in 1932-33, the deficit and the new load having to be catered for by the Pigeon House, Cork, and eight smaller local stations. The first-named generated 74 million kWh (nearly forty per cent. of the total of 185 million kWh) instead of 22 million as in the previous year. The aggregate maximum load was 65,700 kW. Ardnacrusha was closed down for 1,816 hours to economise water, as the average inflow to the catchment was 96 cubic metres per sec. for the year (falling to 40.9 between April 1st and December 31st) compared with a mean average for forty years of 220 cubic metres. The electric boilers at Pigeon House and Cork consumed 1,816,000 kWh, supplied from Ardnacrusha. Losses in h.v. transmission amounted to 11.6 per cent. of those generated.

About 60 miles of h.v. and 110 miles of l.v. overhead and underground mains were constructed. The total route mileage of h.v. lines (5-kV and above) was 2,670 (175 at 110 kV and 1,180 at 38 kV). The two 110-kV sub-stations had a combined capacity of 83,000 kVA, the seventy-two 38-kV sub-stations 110,000 kVA, and the 610 lower-voltage sub-stations 117,000 kVA.

In addition to the undertakings operated by the Board there were 104 holding permits from the Board, including thirteen new concerns.

# Traction

**Australia.**—FREMANTLE REPORT.—The annual report of the Fremantle Tramways and Electric Lighting Board for the year ended August 31st last shows a net profit of £20,337, compared with a profit of £19,804 in the preceding year. Income was £123,155, against £122,005, and working expenses £98,898 (£98,920). Although revenue from the tramways had been consistently falling since 1929 there was a slight increase, the total being £43,225. Receipts from the sale of electricity were £79,899, an increase of £1,145.

**Darlington.**—TROLLEY-BUSES.—The Town Council has decided to adjourn consideration of a scheme for extending the trolley bus route. The matter will be reconsidered in February.

**Denmark.**—SUBURBAN ELECTRIFICATION.—On November 1st a further stage of the electrification of the Copenhagen suburban lines was opened, namely, from Copenhagen to Valby, a distance of 3.9 km. (2.4 miles). A new station named Dybbolsbro has been opened between Copenhagen and Enghave. The electrified lines now total 27.6 km. (17.2 miles). As the increase in traffic on these lines has been greater than expected, a further six three-car trains have been ordered, and in addition a new station (Borups Alle) will be opened shortly on the line from Frederiksberg to Vanlose.—*Railway Gazette.*

**Great Yarmouth.**—TRACK REMOVAL.—Regarding an application by the Council for sanction to a loan of £5,400 in respect of the work of removing tramway track (£2,680 of this sum being chargeable to the transport undertaking), the Minister of Transport intimated that it was not considered appropriate for a tramway loan to be raised for a purpose which would not in any way increase the capital assets of the undertaking. The Transport Committee has decided to withdraw the application as far as it is concerned and to defray the expenditure out of revenue.

**India.**—BOMBAY SUBURBAN RAILWAYS.—The principal object of electrifying the suburban service of the Bombay, Baroda and Central India Railway was to obtain a cleaner and faster service at less cost. The train mileage operated electrically in 1931-32 was equivalent to 1,428,000 steam-train miles. The cost of working this traffic by steam was estimated at Rs.2,827,000, but the electrical cost (excluding depreciation) was only Rs.2,251,000. The gross savings from electrification were thus Rs.576,000. The net saving in working expenses, after allowing for depreciation, was Rs.389,000. In the absence of electrification it would have been necessary for the B.B. & C.I. Railway to have had four tracks on its suburban service lines, and the cost of this would have been prohibitive. If all factors are taken into consideration, the returns on the outlay are sufficiently high to justify the electrification and to encourage new schemes.

ELECTRIFICATION OF MADRAS RAILWAYS.—The working results of the past three years of the electric train service of the Madras-Tambaram suburban section of the South Indian Railway are indicative of the success of the scheme. The scheme was started with seventeen units of three coaches each, four locomotives and two battery tenders. The seventeen units have completed approximately 153,756 service miles each. Seven new multiple units were added to the stock in December last. Each three-coach train is formed on the articulated principle, there being only four bogies instead of the usual six. The motor coach placed in the centre contains the operating gear for supplying energy to the four driving motors. All high-voltage equipment is interlocked with the entrance door. The master controllers are supplied with electrical energy at 60 V. Energy is transmitted from the Madras Electric Supply Corporation's power station at Basin Bridge to the Railway Company's sub-station at Egmore, where it is converted to d.c. by means of mercury-arc rectifiers. The South Indian Railway adopted mercury-arc rectifiers in 1930, and it is claimed that this equipment is the first and only equipment of its kind operating in British India. From the Egmore sub-station, energy is taken to the Minambakham sub-station, ten miles away, by duplicate 33 kV overhead lines, for the service from Sidapet to Tambaram. During 1933-34 the maximum number of tickets sold reached the record of 232,870 in the week ended January 6th last; the average number of tickets sold per week was 137,778, an increase of 9.2 per cent. over the previous year. These figures do not include season tickets.

**L.N.E. Railway.**—ELECTRIC SIGNALLING.—Signalling on the L.N.E.R. main Edinburgh to Glasgow line between Saughton and Queensferry Junction is now worked by the new automatic electric track system. This is the second section of the main line to be worked by automatic signals.

**Newcastle-on-Tyne.**—ADDITIONAL TRAM SERVICE.—The City Council has started a new tram service from Brunton Lane, North Gosforth, to Newcastle Central Railway Station.

**Newport (Mon).**—TRAMWAYS.—The Town Council is considering the supersession of trams by trolley-buses or motor vehicles, in view of the heavy cost of necessary works, including the extension and doubling of track and repair of tramcars. As the Council owns a modern power station with a capacity greater than present load requirements, it is believed that trolley-buses will be used.

**Poland.**—RAILWAY ELECTRIFICATION.—The contract for the overhead equipment and rail bonding of the first portion of the State Railways of Poland to be electrified has been placed with B.I. Cables, Ltd. The work is being carried out on behalf of the Contractors' Committee for the Electrification of Polish Railways. The tracks to be electrified consist of a complicated system of suburban lines in Warsaw with 1½ kilometres of double-track tunnel and double tracks to Zyrardow, in the south-west, to Otwock, in the south-east, and to Nowa Minsk, in the east, equivalent to a total mileage of 155 miles of single track. The system will be 3,000 V d.c. A double-contact wire will be used, each wire being supported from the catenary at alternate droppers. The catenaries for each track are to be supported by independent structures with special provision for longitudinal movement of catenary and contact wires due to the wide extremes of temperature obtaining in Poland. The bonds are to be of the welded type attached to the rail head.

**Russia.**—MOSCOW SUBURBAN LINES.—The electrification of the suburban lines from Moscow to Mitischi, Sofrino, Bolshevo, and Sagorsk now extends to a mileage of about 110. The electrification has cost 31,600,000 roubles. Direct current at 1,500 volts is used in the contact wire, and the yearly consumption of energy averages 23,000,000 kWh. The service is maintained by thirty-two trains which make an average daily run of 280 miles and a maximum of 370 miles. The schedule speed of the stopping trains is 24-26 m.p.h., and of the fast trains 32-37 m.p.h. Over 70,000,000 passengers were carried in 1933, as many as 300,000 being transported in one day.—*Railway Gazette.*

# Communications

**Aircraft Radio.**—TRANS-PACIFIC FLIGHT.—For his proposed flight from Vancouver to Melbourne, Capt. C. T. P. Ulm has had installed in his Airspeed "Envoy" a complete Marconi equipment of a type that will enable him to maintain contact with both medium-wave and short-wave ship and shore stations. The wireless transmitting and receiving equipment is the combined medium- and short-wave type A.D.37/38, which is widely used on long-distance airways, while the "homing" device is of a new type (A.D.52), which incorporates an extra stage of high-frequency amplification and thus allows a smaller loop aerial to be employed. The direction-finding loop aerial is actually fitted round the fuselage, about two-thirds of the way between the nose and the tail. Power for both the wireless equipment and for lighting the aircraft is obtained from a single combined h.v. and l.v. wind-driven generator. There is also an emergency short-wave transmitter housed in the tail of the machine.

**Australia.**—TELEPHONES.—At the end of September there were 100,677 telephone subscribers in Melbourne, equivalent to 9.32 per cent. of the population. Comparative percentages were: Adelaide, 8.83; Sydney, 8.66; Hobart, 8.46; Brisbane, 8.24; and Perth, 7.64.

**Austria.**—RADIO EXHIBITION.—Our Vienna correspondent reports that an exhibition has recently been held to celebrate the ten years of broadcasting in the country. It has been organised by "Ravag" (Radio Verkehrs A.G.), which started with a transmitter at Stubenring ten years ago. The original transmitter at Stubenring was shown in the exhibition. To-day "Ravag" possesses a powerful and modern 100-kW station at Bisamberg, as well as small transmitters in Linz, Graz, Salzburg, Klagenfurt, Innsbruck, and Dornbirn. The number of listeners in Austria is half a million, and the growth was demonstrated diagrammatically at the Radio Wien stand. Various radio and television sets were exhibited, and in the electro-medicinal section ultra-short wave transmitters for high-frequency therapeutics were shown. The selenium cell had its own stand, where alarm and signal apparatus were demonstrated. The police, army, and air force exhibited special uses for radio.

**The "Ravag" studio at the Radio Exhibition, Vienna**

**Belgium.**—TELEPHONIC COMMUNICATION.—Efforts are being made to popularise the use of the telephone in Belgium. At the present time there are about 236,000 subscribers, with 316,000 instruments.

**Cardiff.**—DIRECTIONAL RADIO.—There is a possibility that Cardiff aerodrome may be chosen as the site for the new directional wireless station which is to be erected in the West of England for the guidance of aircraft.

# Contract Information

*When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below*

## Contracts Open

**Australia.**—SYDNEY.—Municipal Council. January 7th. Automatic boiler control equipment for three boilers at the Bunnerong power station. (A.Y. 12737.)*

January 14th. Supervisory control equipment for the remote control of switchgear and transformers in a 33-kV sub-station. (A.Y. 12764.)*

BRISBANE.—January 25th. City Council. One 18,750-kW steam driven turbo-alternator, together with cooling equipment, piping, &c. (A.Y. 12741.)*

MELBOURNE.—Posts and Telegraphs Department. January 29th. Ringing and tone equipment (vibratory type) and delayed alarm control equipment. (A.Y. 12771.)*

**Bath.**—November 26th. Corporation. Electric lighting fittings for new municipal technical college. (November 16th.)

**Brighton.**—November 27th. Electricity Department. Electric lamps for street lighting for the year ending December 31st. (November 16th.)

**Bristol.**—December 12th. Electricity Department. Five l.p. switchboards and five e.h.p. armour-clad compound-filled switch panels. (See this issue.)

**Dundee.**—November 26th. Corporation. Various works, including electric lighting installations, at Mid Craigie housing scheme. Particulars from city quantity surveyor, 21, City Square; tenders to town clerk.

**East Retford.**—December 3rd. Corporation. E.h.p. cubicle board and l.p. board. (See this issue.)

**Hastings.**—November 29th. Electricity Department. Materials for the year commencing January 1st, 1935. (October 26th.)

**Kingston-on-Thames.**—December 7th. Electricity Department. Two 500-kVA transformers. (See this issue.)

**London.**—November 27th. Metropolitan Water Board. Overhaul and repair of lighting and power installation at the head offices of the Board. (November 9th.)

**Morocco.**—RABAT.—December 27th. Posts and Telegraphs Department. Telephone cable. (A.Y. 12756.)*

**Newton-in-Makerfield.**—December 17th. Electricity Department. 400-kVA and 200-kVA transformers and 11-kV circuit-breaker. (See this issue.)

**New Zealand.**—CHRISTCHURCH.—Electricity Department. January 15th. Metal-clad switchgear. (A.Y. 12723.)*

WELLINGTON.—Posts and Telegraphs Department. January 9th. Telephone dials, impulse wheels, &c. (A.Y. 12752.)*

January 21st. 100 microtelephone set cases and 100 microphone transformers. (A.Y. 12754.)*

January 23rd. Telephone equipment. (A.Y. 12776.)*

January 24th. Telephone headgear receivers. (A.Y. 12753.)*

January 29th. Telephone instrument and switchboard cords. (A.Y. 12750.)*

February 13th. Power relays. (A.Y. 12780.)*

Public Works Department. February 19th. 50-kV outdoor switchgear, including steelwork, for Henderson sub-station. (A.Y. 12758.)*

March 5th. Seven 8,000-kVA transformers. (A.Y. 12757.)*

**Scarborough.**—November 23rd. Electricity Department. Electric cookers. (November 16th.)

**Scotland.**—Department of Agriculture. Tenders for various works, including electrical, at houses and steadings in various land settlement schemes are shortly to be asked for and contractors should communicate with the chief engineer and surveyor, Department of Agriculture, York Buildings, Queen Street, Edinburgh, by November 28th, stating what they wish to tender for (deposit £1 1s.).

**Scunthorpe and Frodingham.**—December 3rd. Electricity Department. One 500-kVA and one 200-kVA transformer. (November 16th.)

**South Africa.**—JOHANNESBURG.—January 7th. Railways and Harbours Administration. One electrically driven overhead travelling crane. (A.Y. 12760.)*

**Southend-on-Sea.**—December 6th. Electricity Department. Two alternators and switchgear. (November 2nd.)

December 7th. Electricity Department. Adaptation of motors and apparatus on consumers' premises from d.c. to a.c. (November 16th.)

**Tasmania.**—HOBART.—Hydro-Electric Commission. January 7th. Metering equipment. (A.Y. 12774.)*

**Walton and Weybridge.**—November 28th. Electricity Department. One 11,000-V feeder cable. (November 16th.)

**West Ham.**—November 26th. Electricity Department. Coal and p.i. cables for twelve months ending December 31st. (November 9th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

## Contracts Closed

**Belford.**—Parish Council. Accepted. Transmission lines, street lighting brackets, &c.—F. Reid Ferens & Co.

**Birmingham.**—Accepted. Electrical contract for the Birmingham Hospital centre (£30,000).—B. French, Ltd.

**Bournemouth.**—Transport Committee. Accepted. Cable for trolley-bus services (£14,774).—W. T. Glover & Co., Ltd.

**Glasgow.**—Police Committee. Accepted. 498 police lanterns and seven switchboards for charging batteries (£878).—S. Smith & Sons, Ltd.

Education Committee. Accepted. Electrical work at St. Mark's temporary school annexe (£565).—Woodward, Sons & Co., Ltd.

Lighting Committee. Accepted. 500 steel poles (£4,312) and 200 extension pieces (£525).—Stewarts & Lloyds, Ltd. Cable (£819).—British Electrical & Manufacturing Co.

**Government Contracts.**—The following contracts were placed by the various Government Departments during October:—

ADMIRALTY.

Motor alternators.—Electric Construction Co.; Haslam & Newton; W. Mackie & Co.

Battery containers.—I.R.G.P. & Telegraph Works Co.

Steam boiler plant, &c.—Sturtevant Engineering Co.

Electric cable.—Henley's; Hooper's Telegraph & I.R. Works; I.R.G.P. & Telegraph Works Co.; Johnson & Phillips; Liverpool Electric Cable Co.; Macintosh Cable Co.; Mersey Cable Works; Metropolitan Electric Cable & Construction Co.; Siemens Electric Lamps & Supplies; Ward & Goldstone; Anchor Cable Co.; B.I. Cables; Edison Swan Cables; Enfield Cable Works; G.E.C.; Greengate & Irwell Rubber Co.; W. T. Glover & Co.; Hackbridge Cable Co.

H.p. air compressors.—Peter Brotherhood. Sub-contractors for electrical equipment: W. H. Allen, Sons & Co.; Laurence, Scott & Electromotors.

Electric lighting, and power and lightning conductor installation.—G. E. Taylor & Co.

Table fans.—G.E.C.; Veritys.

Generators, motor and boosters.—Haslam & Newton; W. Mackie & Co.

Handles, holders, &c.—W. McGeoch & Co.; H. W. Sullivan; G.E.C.; Walters Electrical Mfg. Co.

Boiler headers.—Babcock & Wilcox.

Planing machine.—Loudon Bros. Sub-contractors: Lancashire Dynamo & Crypto for motors; Brookhirst Switchgear for control gear; Allen West & Co. for starters.

Oscillators and wavemeters.—Radio Instruments.

Bilge pumps.—Drysdale & Co. Sub-contractors: Sunderland Forge & Engg. Co. for motors; E. N. Bray for starters.

Parabolic reflectors for searchlight projectors.—C. A. Parsons & Co. Sub-contractors: Pilkington Bros.

Resistances.—H. W. Sullivan; British Electric Resistance Co.; Radio Instruments; Zenith Electric Co.

Electrical gear for vertical frame saw.—B.T.H. Co.

Automatic starters, &c.—Watford Electric & Mfg. Co.

Steering gear.—Brown Bros. Sub-contractors: Variable Speed Gear for v.s.g. units; W. H. Allen, Sons & Co. for motor; E. N. Bray for starter.

Superheaters, &c.—Unit Superheater & Pipe Operating Co.

Switches.—W. McGeoch & Co.; L. Weekes (Luton); Whipp & Bourne.

Wireless valves.—Mullard Radio Valve Co. Sub-contractors: Silica Syndicate; H. W. Sullivan.

Welding motor generators.—Met.-Vick. Elecl. Co.

Oil driven generators.—Peter Brotherhood.

WAR OFFICE.

Searchlight lamps.—Chance Bros. & Co.

W.t. sets.—Marconi's.

AIR MINISTRY.

Electric fans.—G.E.C.

Generating set.—Mirrlees, Bickerton & Day.

Motor generators.—Small Electric Motors.

Spares for motor generators.—Rotax.

Soldering irons.—Browning's Electric Co.

Pedestal lamps.—Veritys.

Plugs and sockets.—G.E.C.

Transmitters.—Marconi's.

POST OFFICE.

Telephonic apparatus.—Automatic Electric Co.; Thos. De la Rue & Co.; Ericsson Telephones; G.E.C.; Moulded Products; Phœnix Telephone & Electric Works; Siemens Bros.; Standard Telephones; Telephone Mfg. Co.

Testing and protective apparatus.—Phœnix Telephone and Electric Works; Power Equipment Co.

Leclanché battery boxes.—Ericsson Telephones; Siemens Bros.

Cable.—Siemens Bros.; Hackbridge Cable Co.; G.E.C.; Henley's; London Electric Wire Co. & Smiths; Standard Telephones.

Cable drums.—Pirelli-General.

Clocks.—Automatic Electric Co.; Gillett & Johnston.

Loading coils.—Automatic Electric Co.; G.E.C.; Siemens Bros.; Standard Telephones.

Telephone cords.—B.I. Cables; London Electric Wire Co. & Smiths; L.P.S. Electrical Co.; Siemens Bros.

Flameproof wire.—Macintosh Cable Co.

Cabling.—Lincoln - Spilsby - Skegness: United Telephone Cables.

Cabling, loading coils and terminations.—Liverpool-Glasgow: Pirelli-General.

Telephone exchange equipment.—Pontypridd; Boston: Automatic Electric Co. Sub-contractors: Alton Battery Co. for batteries; Electric Construction Co. for motor generators. Southsea, Waterlooville (Portsmouth); Manchester: Automatic Electric Co. Chorley: Ericsson Telephones. Sub-contractors: Hart Accumulator Co. for batteries; Electric Construction Co. for motor generators. Berwick-on-Tweed: Ericsson Telephones. Sub-contractors: Pritchett & Gold & E.P.S. Co. for batteries; Electric Construction Co. for motor generators. Knaresborough; Holmwood: Ericsson Telephones. Cupar; Firth Park and Park (Sheffield); Birmingham: Siemens Bros. Wood Street and Waterloo (London): Standard Telephones. Sub-contractors: Chloride Elecl. Storage Co. for batteries; Electric Construction Co. for motor generators: W. Jones & Co. for ringing machines. Bayswater: Standard Telephones.

Telephonic repeater equipment.—Hull: Standard Telephones. Canterbury; Guildford: G.E.C.

H.M. OFFICE OF WORKS.

Ducts, cable and building and altering manholes at National Physical Laboratory.—Harland & Wolff.

CROWN AGENTS FOR THE COLONIES.

Diesel-electric shunting locomotive.—Sir W. G. Armstrong, Whitworth & Co.

Petrol-electric mobile crane.—Ransomes & Rapier.

Static condensers.—Telegraph Condenser Co.

Sub-station switchboard.—Standard Switchgear.

Telephone apparatus and indoor and outdoor sub-station equipment.—G.E.C.

Turbo-generator plant.—Met.-Vick. Elecl. Co.

Wireless beacon.—Marconi's.

**Kent.**—Electricity supply to staff cottages at Leybourne Grange Colony (£287).—W. T. Henley's Telegraph Works Co., Ltd.

**Lewisham.**—Housing Committee. Recommended. Wiring seventy-three houses (£511).—E. Dyne & Co., Ltd. This was the lowest of nine tenders, the highest being £1,250.

**London.**—London and Home Counties J.E.A. Accepted. Part supply of p.i. cables for twelve months.—Derby Cables, Ltd.

**Middlesex.**—Highways Committee. Accepted. Traffic signals: at Southgate (£365) and Tottenham (£500).—Siemens & General Electric Railway Signal Co., Ltd.; at Ponders End (£558).—Automatic Electric Co., Ltd.

**Peterborough.**—Electricity Committee. Accepted. Coal-drying plant at the electricity works (£3,925).—E. Newell & Co., Ltd.

**Sunderland.**—Town Council. Accepted. Electric meters.—British Sangamo Co., Ltd.; Ferranti, Ltd. Cables.—British Insulated Cables, Ltd.; Metropolitan Electric Cable & Construction Co. V.i. wire.—Hackbridge Cable Co.; Metropolitan Electric Cable & Construction Co.

**Worthing.**—Lighting Committee. Accepted. Time switches.—Stanley Electric Co.; Bowden Bros., Ltd. Lamp columns.—Stanton Ironworks Co., Ltd.; Siemens Electric Lamps and Supplies, Ltd.

# Forthcoming Events

**Birmingham Electric Club.**—Friday, November 23rd. Grand Hotel, Birmingham. 7 p.m. "High Rupturing Capacity Fuses and Their Applications." Mr. A. M. Pooley.

**Association of Mining Electrical Engineers.**—Saturday, November 24th. 3 p.m. Official visit to the Engineering Exhibition, Cardiff.

**Institution of Electrical Engineers.**—Monday, November 26th. Institution, London. 7 p.m. Informal meeting. Discussion on "Modern Electric Vehicles." Opened by Lieut.-Col. G. D. Ozanne. (*North-Eastern Students' Section*).—Friday, November 23rd. Tilley's Grand Assembly Rooms, Newcastle-on-Tyne. 8 p.m. Annual dance. Friday, November 30th. Armstrong College, Newcastle-on-Tyne. 7.15 p.m. Address by Mr. L. E. Mold. (*Transmission Section*).—Friday, November 23rd. Harrod's Georgian Restaurant, Knightsbridge. 8 p.m. Conversazione, supper-dance and exhibition of overhead line equipment. (*Mersey and North Wales (Liverpool) Centre*).—Monday, November 26th. Adelphi Hotel, Liverpool. Annual dinner. (*Mersey and North Wales (Liverpool) Students' Section*).—Monday, November 26th. Adelphi Hotel, Liverpool. Annual dinner. Tuesday, November 27th. The University, Liverpool. 7.30 p.m., "Gas-filled Relay Applications." Mr. H. R. Noble. (*North-Eastern Centre*).—Monday, November 26th. Armstrong College, Newcastle-on-Tyne. 7 p.m. "Hydro-electric Development in Great Britain." Messrs. A. S. Valentine and E. M. Bergstrom. (*London Students' Section*).—Tuesday, November 27th. Institution, London. 6.30 p.m. Joint meeting with the Students of the Institution of Railway Signal Engineers. "Power Signalling at Paddington." Mr. P. G. Jacobs. (*North Midland Students' Section*).—Tuesday, November 27th. Hotel Metropole, Leeds. 7.15 p.m. Two short papers by Messrs. L. F. Southern and Ginn. (*North-Western Students' Section*).—Tuesday, November 27th. Engineers' Club, Manchester. 7.15 p.m. "The Schering Bridge." Mr. W. S. Robson. (*Scottish Centre*).—Tuesday, November 27th. Grosvenor Restaurant, Glasgow. 6.30 for 7 p.m. Annual dinner. (*South Midland Students' Section*).—Tuesday, November 27th. James Watt Memorial Institute, Birmingham. 7 p.m. Students' lecture. "Modern Street Lighting." Mr. C. C. Paterson. (*Western Centre*).—Wednesday, November 28th. Merchant Venturers' Technical College, Bristol. 7 p.m. Joint meeting with the Western Branch of the Institution of Mechanical Engineers. "Some Factors in the Design of Condensing Plant." Messrs. H. L. Guy and E. V. Winstanley. Thursday, November 29th. 3.30 p.m. Official visit to the Engineering Exhibition, Cardiff. (*West Wales (Swansea) Sub-centre*).—Thursday, November 29th. Electric House, Swansea. 6.30 p.m. "Generation, Distribution and Use of Electricity on Board Ship." Messrs. C. W. Saunders, H. W. Wilson, and R. G. Jakeman. (*South Midland Centre*).—Friday, November 30th. Grand Hotel, Birmingham. 7 p.m. Annual dinner.

**Nottingham Society of Engineers.**—Monday, November 26th. Welbeck Hotel, Nottingham. 7.30 p.m. "The Science of Illumination." Mr. J. W. Howell.

**Institution of Welding Engineers** (*North-Western Branch*).—Wednesday, November 28th. Manchester College of Technology, Manchester. "The Fundamentals of Electric Welding." Mr. J. H. Paterson.

**Association of Mining Electrical Engineers** (*Kent Sub-branch*).—Saturday, December 1st. Dover Technical Institute, Dover. 6.30 p.m. "Practical Cable Jointing with Demonstrations." Mr. W. Rowland. (*West Wales Branch*).—Saturday, December 1st. Y.M.C.A., Swansea. "Protection of Overhead Lines." Mr. J. E. Wilkinson.

# Notes

## The Illuminating Engineering Society

The display of lighting equipment which for some years has been a regular feature of opening meetings of the Illuminating Engineering Society has this year been more comprehensive than ever. Electric discharge lamps—especially the three outstanding novelties of the year, the 250-W lamp, the colour-corrected lamp and the lamp with horizontal tube—figured largely among the exhibits. Fittings for underwater lighting, the ingenious hospital lighting unit shown by Mr. Harold Bright, and the recently introduced direct reading photo-electric photometers (of which a variety of types is now available) were also on view. A new departure was the repetition of the display in Birmingham and Liverpool of most of the apparatus shown in London. These presentations in provincial cities of lighting progress have proved popular at Birmingham, where the hall at the Chamber of Commerce was filled to capacity, thanks largely to various firms which gave their support.

## The E.A.W.

A branch of the Electrical Association for Women is being formed in Croydon. The inaugural meeting on November 20th was to be addressed by Miss Haslett, Mrs. G. Z. de Ferranti, and Sir Montague Hughman. Mr. Councillor A. Lester Boddington was to take the chair.

## New Diesel-electric Paddle Steamer

Further particulars are now available of the *Kenilworth*, the new Diesel-electric paddle steamer ordered by the L. & N.E. Railway Co. for Clyde service from Messrs. A. & J. Inglis, Pointhouse, Glasgow. The main power equipment will consist of two 400-h.p. Diesel engines specially mounted and slung on springs to avoid noise and vibration. Each engine will be directly coupled to a d.c. generator which will supply power, either separately or in parallel, to a double-armature d.c. motor mounted on the paddle shafts. The engines and generators will run at 600 r.p.m., but the motor will run at such a slow angular velocity that no gearing will be required, *viz.*, at about 60 r.p.m. for full speed. The boat is expected to be the fastest "paddler" of her type in the world, seventeen knots being the specified speed. A remarkable feature of her equipment will be the absence of the usual telegraph between the bridge and the engine room. The officer on the bridge will have complete control and will be able to manœuvre the ship by operating control levers as if he were driving an ordinary electrical land vehicle. The double armature motor will permit the paddles on port and starboard to be driven one forward and the other astern, in addition to the usual dead slow, half and full speeds.

## Electric Wiring in Passenger Steamers

In the House of Commons on November 16th Mr. Temple Morris asked the President of the Board of Trade whether, as a result of the recent shipping disasters, he was satisfied that sufficient inspection was carried out of all electric wiring apparatus in British passenger steamers; and whether he had called the attention of shipowners to this matter within the last two years. Dr. Burgin, who replied, said that he had no reason to think that the present inspection of such apparatus was not sufficient. The attention of shipowners had not recently been specially drawn to this matter by the Board of Trade but shipowners and the other interests concerned were asked to take into consideration the whole question of precaution against fires in passenger ships in May, 1932, and he was aware that they had given special attention to electric wiring in the investigation.

## The Increasing Use of Electricity

Speaking at the annual dinner of the Tees-side Section of the Electrical Power Engineers' Association at Middlesbrough, Mr. D. Maxwell-Buist, of the C.E.B., gave an account of the progress made by the electrical industry in this country during the last few years, compared with the decline which had taken place in other countries. He quoted figures showing that for October the consumption of electricity on the North-East Coast was 16 per cent. up on 1933. This was remarkable as the area was one of the worst distressed areas in the country.

Mr. J. M. Gibson (Middlesbrough) presided at the dinner and those present included the Mayor of Middlesbrough, Mr. H. A. Toynbee, president E.P.E.A., Mr. W. A. Jones, general secretary, and Mr. J. S. Watson.

## Appointments Vacant

Junior mains assistant for Ayrshire Electricity Board.

Electrical engineering draughtsmen for the Air Ministry.

Control engineer for Croydon Corporation Electricity Department.

(See our classified advertisements.)

# Makers' Names Wanted

CROSLAC industrial dispersive reflector.

COSMOCORDE electric turntable.

Three-pin 5-A combined switch and plug marked "S.P. No. F.252."

ELECTRON wire for welding (specification No. A.Z.102).

FRIHO electric hairdryer.

Quartz tubes 15 in. external diameter by 5½ in. deep and 14 in. by 10½ in. with walls 8 mm. thick.

BONITAGE fuse-bridges or ironclad switchgear.

# Our Personal Column

**Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements**

**Mr. D. J. Williams,** the author of the article on "The Small Undertaking," which appeared in our last issue, received a full-time electrical and mechanical-engineering course at the School of Mines, Treforest, in 1918 and 1919, and during this period had "sandwich" experience with the South Wales Power Co., Ltd., at Upper Boat power station, Treforest. At the end of 1919 he secured an appointment on the electrical staff of the Powell, Duffryn Co., Ltd., at its Bargoed Collieries, and remained there until May, 1923, when he took up an appointment on the electrical staff of the Tredegar Iron & Coal Co., Ltd., at its Oakdale Collieries. He was appointed clerk of works for an electricity scheme under the Mynyddislwyn U.D.C., with whom he was subsequently appointed resident engineer, and at a later date to his present position of engineer and manager of the electricity undertaking. He is an A.M.I.E.E. and a member of the Associations of Mining and Supervising Electrical Engineers, and for some years was lecturer in electrical engineering at evening classes under the Monmouthshire Education Committee.

[*Lafayette.*

**Mr. D. J. Williams**

In order to cope with increased business and to relieve the joint managing directors, Lieut.-Col. K. Edgcumbe and Mr. Patrick Hamilton, the following additional directors have been appointed to the board of Messrs. Everett, Edgcumbe & Co., Ltd.: **Mr. R. Everett,** who will undertake the works organisation; **Mr. F. Ockenden,** who will be responsible for research and development; and **Mr. A. Drew,** who will devote his energies to the sales side of the business. Readers will remember that a portrait group of the company appeared in our "Driving Forces of the Industry" series in the ELECTRICAL REVIEW of August 5th. 1932.

**Messrs. F. Ockenden, A. Drew and R. Everett, who have been appointed to the board of Messrs. Everett, Edgcumbe & Co., Ltd.**

**Mr. L. Bridgens,** a director of the Cape Electric Tramways, Ltd., and of Meyer, Bridgens & Co., Ltd., manufacturers' agents, Cape Town, has arrived in South Africa on a short business visit. He expects to return to London before Christmas.

**Mr. W. T. Rushton,** whose election as chairman of the Electrical Trades Commercial Travellers' Association was reported in our last issue, informs us that he is not with the Vincent Switchgear Manufacturing Co. He represents Messrs. Nathan & Allen, Ltd., whose agencies include that of the Vincent Switchgear Co.

As had been foreshadowed, **Sir Andrew Duncan,** who has been chairman of the Central Electricity Board for nearly eight years, was appointed independent chairman of the British Iron and Steel Federation at a meeting of the Federation held on November 15th. It is stated that he will resign his chairmanship of the Central Board at an early date, but Press reports suggest that he will be invited to remain on the Board. Sir Andrew graduated at Glasgow University and was admitted a barrister of Gray's Inn in 1920. He was Coal Controller in 1919-20, and was chairman of the Coal Mines Department Advisory Committee from 1920 to 1929. He went to Nova Scotia in 1925 and 1932 as chairman of the Royal Commission sent to investigate and report on the coal industry there. From 1920 to 1927 he was vice-president of the Shipbuilding Employers' Federation, and last year performed the duties of chairman of the Sea Fish Commission. He became chairman of the Central Electricity Board on its formation in 1926, and under his chairmanship the construction of the grid has been successfully completed. He is a director of the Bank of England. Reference to the excellent way in which he has filled the position of chairman of the Board appears in our leader to-day.

**Ald. Sir Percival Bower,** president of the British Electrical Development Association, has been re-elected chairman of the Birmingham Corporation Electric Supply Committee.

**Miss Marcia Stephens,** for the past eight years in the service of the Kingston-upon-Thames Corporation Electricity Department, has been appointed chief electrical demonstrator with the Heston and Isleworth Council. Miss Stephens was presented with a handbag and an electric clock by members of the Corporation's staff.

**The bust of the late Sir George Sutton which has been placed in the vestibule of Henley's head office. (See note on p. 728.)**

**Mr. F. Freemantle,** senior telephone inspector, British Guiana, has been appointed inspector, Engineering Branch, Department of Posts and Telegraphs, Palestine.

**Ald. J. W. Longley,** consulting electrical engineer, has been re-elected Chairman of the Bradford Corporation Electricity Committee. Ald. Longley is one of the I.M.E.A.'s representatives on the sub-committee of the National Electrical Convention.

**Ald. H. Lupton,** past Lord Mayor of Leeds, a prominent figure in Leeds engineering circles and in the development of the Leeds electricity undertaking, has tendered his resignation from the City Council after twenty-two years' continuous service. He is seventy-three years of age.

**Mr. Howard Foulds,** secretary of Callender's Cable & Construction Co., Ltd., was on Tuesday last elected president of the Chartered Institute of Secretaries, and takes office from December 1st. Mr. Foulds is chairman of the Caterham and Warlingham Urban District Council.

[*Elliott & Fry.*

**Sir Andrew Duncan**

**Councillor E. R. Canning,** of Messrs. W. Canning & Co., Ltd., of Birmingham, has been elected chairman of the Finance Committee of the Birmingham City Council. He has been a member of the Committee for three years.

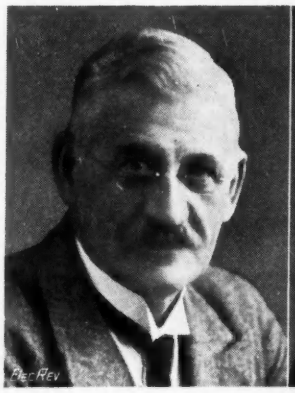
[*H. J. Whitlock & Sons*

**Mr. H. W. Wilson, who is joint author with Messrs. Saunders & Jakeman of the paper on electricity on board ship, read at the I.E.E. last evening**

We regret to learn that **Mr. R. H. Bartley,** the general manager of the Auckland Electric Power Board, New Zealand, who is at present on a visit to this country, has been unable to attend to business matters for the next three or four weeks.

**Mr. J. D. Knight,** who retired from the position of borough electrical engineer to Ealing Corporation in July last, was presented with an illuminated address on November 13th expressing the appreciation of the Mayor, aldermen and councillors of his past services and their wishes for his health and happiness in his retirement. A wrist watch was presented to Mrs. Knight. The presentations were made by the Mayor, Councillor E. H. Brooks.

**Mr. F. Samuelson,** M.I.E.E., M.I.Mech.E., and **Mr. J. S. Ramsden,** M.I.E.E., have been appointed directors of the British Thomson-Houston Co., Ltd. Mr. Samuelson, who is engineer and manager of the turbine factory, has been in the service of the company for over thirty-seven years and has been in charge of the company's turbine design and manufacture since 1903. Previous to this he worked with Sir Hiram Maxim on his quick-firing gun and flying machine. Mr. Samuelson's reputation is world-wide, and a few years ago the Detroit Edison Co. ordered a 10,000-kW turbine to run at 3,600 r.p.m. with steam at 1,000° F.—a much higher total temperature than any that had hitherto been employed in commercial service—to be constructed by the B.T.-H. Co. at Rugby, under his personal supervision. He has been elected to the Council of the Institution of Mechanical Engineers and is chairman of the Midland Section of that Institution. In 1932 the Royal Order of Nordstiernan was conferred on him by the King of Sweden.



[*Elliott & Fry.*

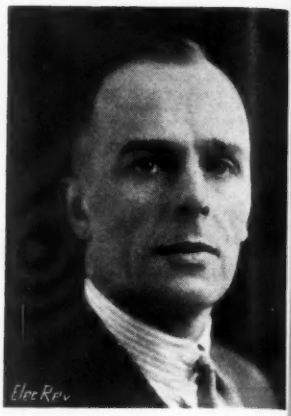
**Mr. F. Samuelson**

[*H. J. Whitlock & Sons*

**Mr. J. S. Ramsden**

Mr. Ramsden, the company's industrial sales manager, joined the B.T.-H. Co. in February, 1910, having previously been with Messrs. Dobson & Barlow, of Bolton, the British Westinghouse Co., at Trafford Park, and in the electrical department of Vickers, Ltd. Shortly after joining the B.T.-H. Co. he was transferred to the commercial side (in the Supply Department). In 1913 he joined the Manchester office staff, returning to the Midlands in 1919 as manager of the Birmingham office. He was appointed to Rugby in 1923 as manager of the department in which he commenced his career. This department has since been extended to cover industrial sales, and Mr. Ramsden, in addition to being manager of this department, also took over the management of district offices. He has done important work as a member of the Electrical Fittings Statutory Committee since its formation in 1927 and as a member of various committees of the B.E.A.M.A.

In order to extend its services to its members, and to assist generally in its work, the British Electrical Development Association has made two new appointments to its head office staff. **Mr. E. M. Ackery,** B.Sc., (Eng)., has been appointed technical assistant specialising in all applications of electric heating for commercial and industrial purposes. Mr. Ackery has been engaged for over ten years in all branches of heating work with Messrs. Sulzer Bros. He has been closely connected with numerous thermal storage heating installations and is fully conversant with all branches of heating, ventilating and air-conditioning. **Mr. P. C. Honey,** has been appointed as technical assistant specialising in the application of electricity to new buildings and rehousing schemes. For the past twelve years he has been a member of the sales staff of the Croydon Corporation Electricity Department, and in that position he has not only made a special study of electric water heating, a subject on which he is an authority, but has also been responsible for arranging with architects and builders for electrical equipment to be installed in houses and flats in the Croydon district.



[*Jerom*

**Mr. P. C. Honey**

## Obituary

**Mr. F. G. R. Jenner,** an installation inspector at the Tunbridge Wells Corporation electricity works, died on November 10th as the result of a motor cycling accident. He was twenty-eight years of age.

**Mr. D. E. Norton.**—The funeral took place on Saturday last of Mr. Downes Elland Norton, of Hampton Hill, Middlesex. Mr. Norton, who was eighty-one years of age, was a director of Evans O'Donnell, Ltd., the Consolidated Signal Co., Ltd., and the Westinghouse Brake Co.

**Mr. J. A. Brodie.**—Mr. John A. Brodie, who was for many years so well known as city engineer at Liverpool, died at his home there on Friday last, aged seventy-six years. He was famous by reason of his connection with various great public works, including the Mersey Tunnel and the planning of New Delhi for the Indian Government.

**Mons. P. Seurot.**—The death is announced of Mons. Paul Seurot, a native of Paris and a noted engineer, at the age of sixty-five, in Ottawa, after a prolonged illness. He directed the construction of the Paris Metropolitan tunnel under the Seine. He was latterly the rapid transit engineer of the Montreal Tramways.—*Reuter* (Ottawa).

**Mrs. Garcke.**—The death occurred at Ditton Meads, near Maidenhead, on Tuesday, at the age of 80 years, of Mrs. Alice Garcke, widow of Mr. Emile Garcke.

# Financial Section

**New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares**

## New Companies Registered

**Central London Electricity Distribution Committee, Ltd.**—Private company. Registered November 14th. Nominal capital, £1,000 in £1 shares. Objects: To prepare, organise, promote and carry into effect any scheme or other arrangements for or with a view to improving the organisation of the distribution and supply of electrical energy within the County of London and adjoining or neighbouring counties or elsewhere, and generally to take all steps and carry out all transactions as may be considered necessary or advisable in connection with any such scheme or other arrangements, &c. The first directors are: The Rt. Hon. Lord Wargrave, P.C., Shiplake Court, Henley-on-Thames (chairman of Westminster Electric Supply Corporation, Ltd.); Sir Francis Fladgate, M.V.O., "Oak Lawn," Arthur Road, Wimbledon, S.W. (chairman of Charing Cross Electricity Supply Co., Ltd.); Charles P. Sparks, C.B.E., Ormesdale, Dorking, Surrey (chairman of the St. James' and Pall Mall Electric Supply Co., Ltd.); Clarence Parker, John A. Gatti, M.C., and Frederick J. Walker. Solicitors: Slaughter & May, 18, Austin Friars, E.C.

**Hampshire Hire-Purchase Co., Ltd.**—Private company. Registered November 16th. Capital, £5,000 in £1 shares. Objects: To acquire the hire-purchase business carried on by R. Musgrove and E. V. Johnson, at 331, Shirley Road, Southampton,

and to carry on business as agents or dealers in, on hire purchase, on credit or for cash or otherwise, in radio and television sets, gramophone and sound-reproducing machines, electric lighting and power installations, electrical accumulators, or batteries, clocks, motor cars, fires and washing machines, etc. The first directors are: R. Musgrove, Wynford, Belbins, Romsey, Hants, and E. V. Johnson, Caldy, Testwood Place, Totton, Southampton. Registered office: 331, Shirley Road, Southampton.

**Moseley & Co., Ltd.**—Private company. Registered November 17th. Capital, £2,500 in £1 shares. Objects: To acquire the business of an electrical contractor and engineer carried on by Hubert K. Houghton, as Moseley & Co. (incorporating the Moseley-Neon Manufacturing Co.), at 189, Spon Street, Coventry. The subscribers are: L. J. Facer, 19, Claremont Road, Rugby, and K. W. Barber, 16, Melbourne Road, Coventry. Solicitors: W. J. Mealand, 12, Warwick Row, Coventry.

**Multiplex (Yorkshire), Ltd.**—Private company. Registered November 8th. Capital, £2,000 in £1 shares. Objects: To adopt an agreement with Robert Colin and to carry on the business of manufacturers of and dealers in electric lamps, cables, batteries, wireless sets and gramophones, &c. The first directors are: R. Colin, Victoria Road, Scarborough; and F. Heptonstall, 34, The Avenue, Whitby. Secretary: E. W. Knox. Registered office: Victoria Chambers, 17, Little Horton Lane, Bradford.

**Brown & Company (Ilford), Ltd.**—Private company. Registered November 16th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in all kinds of equipment connected with electrical devices, wireless telegraphy, &c. The first directors are: A. Brown and H. Brown, both of 1a, Talbot Gardens, Goodmayes, Ilford. Secretary: A. Brown. Registered office: 1A, Talbot Gardens, Goodmayes, Ilford.

**Rolyat Radio (Tooting), Ltd.**—Private company. Registered October 29th. Capital, £100 in £1 shares. Objects: To carry on the business of electricians, mechanical, wireless, telegraph or telephone, electrical, motor, or experimental engineers, manufacturers, factors, hirers of and dealers in all kinds of electrical and wireless telephone or telegraph apparatus, gramophones, motor vehicles, &c. The directors are: S. A. Taylor and Mrs. Mary D. Taylor, both of 180, Mitcham Road, S.W.17. Registered office: 180, Mitcham Road, Tooting, S.W.17.

**Whitehall Radio & Electrical Supply, Ltd.**—Private company. Registered November 6th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless instruments, accessories and goods of every description, radio and wireless contractors and electrical engineers, manufacturers of and dealers in musical instruments, &c. The permanent directors are: H. J. K. O'Brien, 69, Hargwyne Street, Stockwell, S.W.9, and H. W. Turner, 35, Lumley Road, Cheam. Registered office: 6, Conduit Street, Regent Street, W.1.

**A. W. H. Engineering Co., Ltd.**—Private company. Registered November 3rd. Capital, £100 in £1 shares. Objects: To carry on the business of mechanical, motor, electrical, radio, cinema and theatre, heating, hydraulic, manual, civil and consulting engineers, &c. The subscribers are: W. S. Gibson, 143, Muswell Avenue, Muswell Hill, N.10, and J. T. W. Appleby, 68, Clifton Court, St. John's Wood, N.W.8. Solicitors: Kenneth Brown, Baker, Baker, Essex House, Essex Street, Strand, W.C.2.

# Returns of Electrical Companies

**R. H. Spence & Co., Ltd.**—F. Pearson, 34, Broadway, Westminster, was appointed receiver on November 12th, 1934, under powers contained in debenture dated August 26th, 1933.

**Leslie Fink, Ltd.**—Two mortgages for £116 7s. 7d., and £326 5s. 11d., respectively, dated January 16th, 1922, and April 11th, 1927, charged on properties in Mitchell Hey, Spotland, Rochdale (being properties acquired by the company on October 18th, 1934). Registered pursuant to Section 81 of the Companies Act, 1929. Mortgagees: Halifax Building Society.

**Cifel Products, Ltd.**—E. A. Shock, Dominion Buildings, 2, South Place, E.C., ceased to act as receiver on November 7th, 1934.

**Seaton and District Electric Light Co., Ltd.**—Debenture charged on deeds and documents relating to properties at Seaton and Colyford, Devon, and the company's undertaking and other property, present and future, including uncalled capital, dated October 31st, 1934, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd.

**Lighting Trades, Ltd.**—Satisfaction in full on October 23rd, 1934, of debentures, dated March 19th, 1926, and March 19th, 1926, and registered March 31st, 1926, securing £95,000 and £55,000 respectively.

**I. Calvete, Ltd.**—Land Registration Charge on 2, 4, and 6, Lillieshall Road, Clapham, dated November 9th, 1934, to secure all moneys due or to become due from the company to Midland Bank, Ltd.

**Tyrela Electric, Ltd.**—Capital, £5,000 in £1 shares. Return dated June 1st, 1934. 352 shares taken up. £352 paid. Mortgages and charges nil.

**Killamarsh & District Electric Supply Co., Ltd.**—Capital, £6,000 in £1 shares. Return dated September 26th, 1934. 4,725 shares taken up. £4,725 paid. Mortgages and charges nil.

**Brilliant Neon, Ltd.**—Capital, £100 in £1 shares. Return dated October 11th, 1934. Two shares taken up. £2 paid. Mortgages and charges nil.

**Ellis & Ward.**—Capital, £10,000 in 2,000 preference and 8,000 ordinary shares of £1. Return dated September 17th, 1934. 1,000 preference and 6,003 ordinary shares taken up. £1,003 paid on three ordinary and 1,000 preference shares, £6,000 considered as paid on 6,000 ordinary shares. Mortgages and charges nil.

**W. Mackie & Co., Ltd.**—Capital, £12,000 in £1 shares. Return dated September 27th, 1934. 7,500 shares taken up. £3,155 paid, £4,345 considered as paid. Mortgages and charges nil.

# City Notes

**Electric & Musical Industries, Ltd.,** held its annual meeting on November 16th, when Mr. A. Clark (chairman), who presided, said that the profit of the operating companies was £408,095, as compared with a loss of £374,482 in 1933. There had been a steady increase in business in the Empire markets, but the foreign business, taken as a whole, was still far from satisfactory. The problem of increasing foreign trading still depended largely upon factors over which they had no control. Of the types of goods which they produced radio receiving sets and radio-gramophones had shown a marked expansion in sales. The Hayes factories were now working to capacity. Their research engineers had developed and demonstrated a successful system of high-definition television. This system included both transmission and reception by sets suitable for use in the home, and in view of the large experience of Marconi's Wireless Telegraph Co. in the field of radio transmission and rights which they had retained in that field, arrangements were entered into with them, resulting in the formation of the Marconi-E.M.I. Television Co., Ltd., in which both companies had contributed their interests in the transmission of television of high definition. The main business of the new undertaking would be to supply transmission apparatus to the broadcasting authorities, both here and in certain foreign countries. With regard to H.M.V. Household Appliances, Ltd., sales of refrigerators had commenced in England and in several overseas territories, with results which, so far, confirmed their belief that there was a growing demand for this type of article. While a considerable part of the manufacture of this refrigerator could be carried on in their existing works, there were components which required special plant. For these they were now making the necessary extensions and eventually the entire article would be made at Hayes. With regard to the current year's prospects, sales for the first four months exceeded those for the corresponding period of last year and they faced the coming months with confidence.

**The Burma Electric Supply Co., Ltd.,** reports a net profit for the year ended July 31st last of £13,548, as against £9,240 in the preceding year. The directors have transferred £5,000 to general reserve and the preference dividend is paid, but again no distribution is recommended on the ordinary shares. The balance carried forward is £9,107, against £7,759 brought in.

**The Melbourne Electric Supply Co.** is paying a final ordinary dividend of 3¼ per cent., making 6¼ per cent., tax free, for the year (same).

**The British Electric Transformer Co., Ltd.,** has declared a final dividend at the rate of 5 per cent. per annum, less tax, on the 5 per cent. preference shares.

**The Southern Areas Electric Corporation** has declared an interim dividend at the rate of 1½ per cent. The shares issued in July rank for the dividend from September 1st. A dividend of 4 per cent. per annum was paid for the period from May 12th to December 31st, 1933.

**The East African Power & Lighting Co.** has announced an interim ordinary dividend of 3 per cent., less tax (same).

**The Kalgoorlie Electric Power & Lighting Co.** has declared an interim dividend of 3 per cent. (actual), less tax.

**The Electric Furnace Co., Ltd.,** has declared an interim ordinary dividend of 2½ per cent. (same).

**Telephone Properties, Ltd.,** has announced an interim dividend of 2 per cent. on the ordinary shares (unchanged).

# Stocks and Shares

TUESDAY EVENING.

FORMATION of a new company with the title of "Central London Electricity Distribution Committee 1934 Ltd." is the outcome of negotiations which have been going on for some time past. These pourparlers have been directed towards the co-ordination of interests, by some of the leading companies, with the intention of doing away with certain anomalies as regards voltages, prices, &c. The immediate effect upon the Stock Exchange Market was to advance the prices of the ordinary shares of the London companies, whether or not these companies are included in the scheme now announced.

That it will involve substantial outlay in the matter of what change-over may be required is regarded as being inevitable, but no fresh issues of capital need be expected in connection with the plan, nor are the dividends at present being paid by the London companies likely to be affected one way or the other. Mention has been made here of the hope that for this present year—1934—the electricity supply companies of London will be able to distribute 7½ per cent. to their shareholders, against the 7 per cent. standard rate that most of them paid for 1933. The St. James' and Pall Mall Company distributed 7½ per cent. last year, but this was an exceptional case. The closer union of the companies is deemed to be a bull point in regard to the security which their shares afford. With investment appetite keen-set, and with prices of all gilt-edged and other investment securities standing at very high figures, the advance in electricity supply shares is, indeed, no more than might have been looked for in such circumstances. There is no reason, so far as can be seen, why the prices should not still further advance before reaction overtakes them.

## A Score of Rises

Turning to particulars, reference to our lists will show that most of the ordinary shares in the London electricity supply companies have risen to a common level of 36s. This gives a yield of £3 17s. 9d. per cent. on the money. Notting Hill ordinary are better at 50s., North Metropolitans at 66s. Both the Scottish companies' shares are better, Clyde Valley and Scottish Power each rising to 43s. Amongst other improvements in the Provincial group may be mentioned Lancashires

at 39s. 6d., Llanellys at 27s. Electric Finance and Securities are up to 67s. 9d., Edmundson ordinary to 43s.

### Public Boards Stocks

London Passenger Transport "C" stock has gained 3 points at 93. Both the "A" and the "B" stocks are better on the week. The "C" stock, frequently quoted here as being the only speculative issue in the group, is being absorbed by investors who want a stock which stands below par, and has the prospect of receiving increased dividends in the near future. In the Central Electricity group, the 3½ per cent. stock has risen to 101; the price of the 3¼ per cent. scrip at 4 premium is not quite so good as it was in the exuberance which carried up the price with such a rush ten days ago. West Midlands 5 per cent. stock at 118, and North West Midland fives at the same price are several points better on the week.

The time is getting very close for judgment to be delivered in the case now before the Courts in respect of the payment which the London Passenger Transport Board is to make to Thomas Tilling for the omnibuses which are to be taken over by the Board. According to the character of the rumour of the day, so Tillings go up or down, while London Passenger Transport "C" stock, moving in more leisurely fashion, proceeds in the contrary direction.

### Cables and Wireless

Inkling of what the Cables and Wireless figures would be for the month of October led to a rise, before the statistics came out, in the preferred and in both the ordinary stocks. Justification was afforded to the optimists by the index number showing an improvement of a little over 3 points as compared with September. The October figures of last year were 1½ points below those just published, and the latter are the best of the current twelve-month with the exception of February. The preferred stock shows a gain on the week of 4 points, and the "A" ordinary is 1¼ up at 17¾. Anticipation talks of the possibility of an increase in the 2½ per cent. dividend now being paid on the preferred, and the increase in the monthly index number is held to be a plain hint in this direction. In sympathy with the rises in Cable stocks, Globe Telegraph ordinary advanced 17s. 6d. to 10½, while the 6 per cent. preference at 12¾ are 2s. 6d. higher. Great Northern Telegraph are 2 points to the good, at 39, this being a reflection, of course, of the investment appetite for sound industrials of all kinds. Anglo-American Telegraph preferred is 2½ up on the week. On the other side of the sheet, a fall of 11 in American Telephone & Telegraphs has lowered the price to 102½, New York being troubled by apprehensions of a cut in the 9 per cent. dividend. The earnings of the Company have been none too good of late, and surprise may be expressed that the 9 per cent. has been maintained with such consistency. International Telephone & Telegraphs gave way to 9.

### Manufacturing and Equipment

An all-round rise in the prices of shares in the electrical manufacturing and equipment companies has brought this section into line with other industrial departments in the Stock Exchange. It is difficult to point to one thing as being a feature more than another. Ericsson Telephone ordinary are now within a shilling of the round £5. Aron Meters are up a florin and Associated Electricals half a crown. General Electric ordinary at 49s. 6d. are 2s. higher. British Insulated, Callender's, Henley's, Siemens and Enfields, are amongst the shares that have been in active demand. The prices show rises in each case. Of the shares not quoted in our weekly lists, Hall's Telephone Accessories have risen to 21s. 6d. London Electric Wire and Smith's ordinary are £1, and the preference 29s. 6d. There is a continual pressure to buy the shares in these companies, and he who comes to deal in them in the Stock Exchange finds frequently that such shares are a good deal easier to sell at a price satisfactory to the client, than they are to buy at a figure which will make the purchaser pleased. There happens to be a line of a few thousand Henley's ordinary on offer at 6⅛. At this price the yield comes to 4½ per cent. on the money.

### Miscellaneous Matters

Another spectacular rise in British Electric Traction ordinary stock has taken the price to 945 ex dividend, being no less than 93 points up on the week. To all appearance, it would seem as though the stock will rise to the four figures which, for some time past, the optimists have prophesied that it will reach sooner or later.

Of the dollar stocks, Brazilian Tractions make a poor showing at 10¾, the price dropping at one time to 10⅜ on pressure to sell from Brussels, in which City a good deal of financial trouble seems to have recently focused. Mexico Tramway fives advanced to 22½, but lost their improvement. The utility shares of the Latin-Canadian companies keep tolerably steady. Iron and steel shares are a good market, thanks to favourable dividends and reports which are now appearing week by week. A rise to 87¾ in Tokyo 6 per cent. bonds testifies to the recovery of confidence in Japanese securities. The price of rubber is weak at 6¼d. per lb. Mincing Lane has had to take a good deal of stale stock from bulls who were disappointed at the failure of rubber to respond to the establishment of the International Rubber Regulation Committee. Stock Exchange business is patchy, coming by fits and starts, but many members of the House find plenty of work to do in the market.

## Share List of Electrical Companies

| | Nom. | Dividend. 1932. | Dividend. 1933. | Price. Nov. 20. | Rise or Fall. | Yield. p.c. £ s. d. |
|---|---|---|---|---|---|---|
| **HOME ELECTRICITY COMPANIES.** | | | | | | |
| Bournemouth and Poole | 1 | 15 | 15 | 78/9 | — | 3 16 2 |
| Brompton Ordinary | 1 | 7 | 7 | 36/– | +1/6 | 3 17 9 |
| Charing Cross Ordinary | 1 | 7 | 7 | 36/– | +6d. | 3 17 9 |
| Chelsea | 1 | 7 | 7 | 36/– | +6d. | 3 17 9 |
| City of London | 1 | 7½ | 7½ | 38/6 | +1/– | 3 18 0 |
| Clyde Valley | 1 | 7 | 7 | 43/– | +1/– | 3 5 1 |
| County of London | 1 | 10½ | 10½ | 59/– | +1/6 | 3 11 2 |
| Edmundson's 7% Pref. | 1 | 7 | 7 | 36/6 | +6d. | 3 16 9 |
| Elec. Dis. Yorkshire | 1 | 9 | 9 | 50/6 | +6d. | 3 11 4 |
| Elec. Supply Corporation | 1 | 11 | 11 | 3 | +⅛ | 3 13 4 |
| Kensington Ordinary | 1 | 7 | 7 | 36/– | +6d. | 3 17 9 |
| Lancs Light and Power | 1 | 7 | 7½ | 39/6 | +1/– | 3 16 0 |
| London Electric | 1 | 7 | 7 | 35/6 | +1/– | 3 19 0 |
| Metropolitan | 1 | 10 | 10 | 55/– | +6d. | 3 12 9 |
| Midland Counties | 1 | 7 | 7 | 2 | +1/– | 3 10 0 |
| Mid. Elec. Power | 1 | 8 | 8 | 48/9 | — | 3 5 7 |
| North Eastern Electric Ordinary | 1 | 6 | 6 | 35/– | — | 3 8 7 |
| Do. 7% Pref. | 1 | 7 | 7 | 35/– | — | 4 0 0 |
| Northampton | 1 | 10 | 10 | 57/– | — | 3 10 2 |
| Notting Hill 6% Pref. | 10 | 6 | 6 | 14½ | — | 4 4 4 |
| North Met. Elec. Ordinary | 1 | 10 | 10 | 66/– | +1/– | 3 0 6 |
| Do. do. 6% Pref. | 1 | 6 | 6 | 32/– | +6d. | 3 15 0 |
| St. James' and Pall Mall | 1 | 7 | 7½ | 38/6 | +1/6 | 3 18 0 |
| Scottish Power | 1 | 8 | 8 | 43/– | +6d. | 3 14 5 |
| South London | 1 | 7 | 7 | 36/– | +6d. | 3 17 9 |
| Westminster Ordinary | 1 | 7 | 7 | 36/– | +6d. | 3 17 9 |
| Whitehall Elec. Invst. 7½% Pref. | 1 | 7½ | 7½ | 21/– | — | 7 2 10 |
| Yorkshire Elec. | 1 | 8 | 8 | 48/6 | +1/– | 3 6 0 |
| **PUBLIC BOARDS.** | | | | | | |
| Central Electricity, 1950–70 | Stock | 5 | 5 | 115 | — | 4 7 0 |
| Do. 1955–75 | ,, | 5 | 5 | 118 | — | 4 4 9 |
| Do. 1951–73 | ,, | 4½ | 4½ | 111 | — | 4 1 1 |
| Do. 1963–93 | ,, | — | 3½ | 101 | +1 | 3 9 4 |
| London & Home Counties, 1955–75 | ,, | 4½ | 4½ | 112 | — | 4 0 4 |
| London Passenger Transport, A | ,, | — | 4½ | 125½ | +1 | 3 11 9 |
| Do. do. B | ,, | — | 5 | 130½ | +1½ | 3 16 6 |
| Do. do. C | ,, | — | 3 | 93 | +3 | 3 4 8 |
| West Midlands Joint Elec. 1948–68 | ,, | — | 5 | 118 | +3 | 4 4 9 |
| **TELEGRAPH AND TELEPHONE.** | | | | | | |
| American Tel. & Tel. | $100 | 9 | 9 | 102½ | —11 | 8 15 8 |
| Anglo-Am. Tel. Pref. | Stock | 6 | 6 | 119 | +½st | 5 0 10 |
| Do. Def. | ,, | 1½ | 1½ | 29 | — | 5 3 5 |
| Cables & Wireless 5½% Pref. | ,, | 2¾ | 2¾ | 80 | +4 | 3 8 9 |
| Do. A. 7½% Ord. | ,, | Nil | Nil | 17¾ | +1¼ | — |
| Do. B. Ord. | ,, | Nil | Nil | 7¼ | — | — |
| Globe Tel. and T. Ord. | 10 | Nil | 2½ | 10½ | +⅞ | 2 7 7 |
| Do. do. Pref. | 10 | 6 | 6 | 12¾ | +⅛ | 4 14 0 |
| Great Northern Tel. | 10 | 20 | 20 | 39 | +2 | 5 2 7 |
| Marconi-Marine | 1 | 10 | 7½ | 31/3 | — | 4 16 0 |
| Oriental Telephone Ord. | 1 | 12 | 12 | 3¼ | — | *3 13 10 |
| **HOME AND FOREIGN TRAMS, ETC.** | | | | | | |
| Anglo-Arg. Trams First Pref. | 5 | Nil | Nil | 1/6 | — | — |
| Do. do. 2nd Pref. | 5 | Nil | Nil | 1/6 | — | — |
| Do. do. 5% Deb. | Stock | Nil | Nil | 5 | —1 | — |
| British Electric Traction Df. Ord. | ,, | 5 | 5 | 945xd | +93 | — |
| Do. do. Pref. Ord. | ,, | 8 | 8 | 167½xd | +4 | 4 15 7 |
| Brazil Traction | 100 | — | — | 10¾ | —¼ | — |
| Brit. Columbia Elec. Rly. Pce. | Stock | 5 | 5 | 106 | — | 4 14 3 |
| Mexico Trams, 5% Bonds | — | 5 | 5 | 20 | —½ | — |
| Mexican Light Common | 100 | Nil | Nil | 2½ | — | — |
| Do. 7% Pref. | 100 | 7 | 7 | 4½ | — | — |
| Do. 1st Bonds | — | 5 | 5 | 40 | — | — |
| Victoria Falls Ord. | 1 | 15 | 20 | 6½ | +⅛ | 3 1 7 |
| Yorkshire (West Riding) | 1 | 2½ | 5 | 25/– | — | 4 0 0 |
| **MANUFACTURING COMPANIES.** | | | | | | |
| Aron Electricity Ord. | 1 | 10 | 10 | 73/3 | +2/– | 2 15 2 |
| Assoc. Elec. Ord. | 1 | 4 | 3 | 24/6 | +⅛ | 2 9 0 |
| Do. Prf. | 1 | 8 | 8 | 33/9 | — | 4 14 10 |
| Babcock & Wilcox | 1 | 9 | 6 | 47/– | +6d. | 2 11 1 |
| British Aluminium Ord. | 1 | 5 | 5 | 29/6 | — | 3 7 9 |
| British Insulated Ord. | 1 | 15 | 15 | 4 | +⅛ | 3 15 0 |
| Brush Ord. | Stock | Nil | Nil | 40½ | — | — |
| Callender's | 1 | 15 | 15 | 3⅜ | +⅛ | 4 9 0 |
| Do. 6½% Pref. | 1 | 6½ | 6½ | 31/3 | — | 4 3 2 |
| Crompton Parkinson Ord. | 5/– | 22½ | 12½ | 35/– | +1/– | 1 15 10 |
| Do. 8% Pref. | 1 | 8 | 8 | 35/– | +⅛ | 4 11 5 |
| Edison-Swan 1st Pref. | 1 | 7½ | 7½ | 23/9 | +⅛ | 6 6 4 |
| Electric Construction | 1 | Nil | Nil | 13/9 | — | — |
| Enfield Cable Ord. | 1 | 25 | 20 | 4⅞ | +⅛ | 4 2 0 |
| English Electric | 1 | Nil | Nil | 5/9 | — | — |
| Do. do. Pref. | 1 | Nil | Nil | 8/9 | — | — |
| Ever Ready | 5/– | 35 | 35 | 27/3 | — | 6 8 5 |
| Ferranti Pref. | 1 | 7 | 7 | 29/– | +1/– | 4 16 7 |
| G.E.C. Pref. | 1 | 6½ | 6½ | 32/6xd | +6d. | 4 0 0 |
| Do. Ord. | 1 | 8 | 8 | 49/6 | +2/– | 3 4 6 |
| Henley's | 1 | 30 | 30 | 6⅛ | +⅛ | 4 10 8 |
| Do. 4½% Pref. | 5 | 4½ | 4½ | 5⅝ | — | 3 18 3 |
| India-Rubber Preferred | 1 | — | — | 1 | — | — |
| Johnson & Phillips | 1 | 5 | 5 | 30/– | — | 3 6 8 |
| Siemens Ord. | 1 | 6½ | 4 | 1 | +⅛ | 4 0 0 |
| Telegraph Construction | £1 | Nil | Nil | 1½ | — | — |

* Dividends paid free of Income Tax.

# Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parenthesis are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

**1932**

36376. "Apparatus for the electrical precipitation of suspended materials from gases." H. A. Brassert & Co., Ltd. (H. A. Brassert & Co.). January 21st, 1933. (418551.)

**1933**

1492. "Automatic circuit-breakers." J. A. Crabtree. January 17th, 1933. (Dividend application of 36040/32.) (418361.)

2157. "Sensitive electromagnetic relay arrangements." H. Moreau. January 26th, 1932. (418577.)

5473. "Intercommunicating telephone systems and calling arrangements therefor." E. Shipton. February 22nd, 1933. (418353.)

7606. "Electric converting systems." British Thomson-Houston Co., Ltd. March 12th, 1932. (418297.)

8213. "Thermionic valve circuits." Siemens & Halske Akt.-Ges. March 18th, 1932. (Cognate applications 8214/33, 8215/33, and 8213/33.) (418435.)

8379. "Electrical conversion or transformation systems." B. C. Von Platen. February 22nd, 1933. (418436.)

8736. "Transformer tap-changing switches." B. Thomas and E. Thomas. March 23rd, 1933. (418507.)

10642. "Electric cigarette lighters." E. W. Fakes. April 10th, 1933. (Cognate application 10643/33.) (418304.)

11089. "Electric motor controllers." Ransomes, Sims & Jefferies, Ltd., and W. Gilbert. April 13th, 1933. (418441.)

11212. "Device for use in radiating parts of the human body with cathode rays." A. Brasch and F. Lange. April 13th, 1932. (418305.)

11418. "Electric signalling systems." Siemens Bros. & Co., Ltd., and H. E. Humphries. April 19th, 1933. (418306.)

11571. "Electric signalling systems." L. E. Ryall. April 20th, 1933. (418442.)

11610. "Electromagnetic brakes." H. Leitner. April 20th, 1933. (Cognate applications 19787/33 and 9702/34.) (418443.)

11807. "Arrangements for the control of power factor of electric circuits." J. A. Kuyser and Associated Electrical Industries, Ltd. April 22nd, 1933. (418310.)

11816. "Control of electric motors." International General Electric Co., Inc. April 22nd, 1932. (418509.)

11824. "Supporting devices for flexible electric cables." N. G. Johnson. April 22nd, 1933. (418447.)

11926. "Electric fittings." V. Amberg. April 24th, 1933. (418378.)

11938. "Telephone systems." Automatic Electric Co., Ltd., R. Taylor and G. T. Baker. April 24th, 1933. (418448.)

11975. "Instruments for measuring the load in consumer circuits." F. Zipernovszky. April 24th, 1933. (418380.)

12032. "Ganged condensers." W. Rogers and Wingrove & Rogers, Ltd. April 25th, 1933. (418382.)

12035. "Electric cooking stoves." N. W. Gilbert. April 25th, 1933. (418452.)

12340. "Modulated carrier-wave transmitters." Marconi's Wireless Telegraph Co., Ltd., and W. T. Ditcham. April 27th, 1933. (418596.)

12821. "Electrical oscillation generators." Telefunken Ges. für Drahtlose Telegraphie. May 2nd, 1932. (418602.)

13101. "Device for testing the high-tension system of motor vehicles." H. Booker. May 5th, 1933. (418317.)

13130. "Manually operable selectors suitable for use in intercommunicating telephone systems." E. Shipton. May 5th, 1933. (418388.)

13508. "Direct electric current transformer devices." G. M. Pestarini. May 9th, 1933. (418461.)

14302. "Electric-optical systems." A. Guerbilsky. May 18th, 1932. (418603.)

14656. "Calling devices in connection with wireless signalling or carrier-frequency line signalling systems." N. S. Clough and Wireless Telephone Co., Ltd. May 20th, 1933. (418525.)

15116. "Television and like systems." J. L. Baird and Baird Television, Ltd. May 25th, 1933. (418527.)

15258. "Illuminated clocks." Claude-General Neon Lights, Ltd., and C. Higgins. May 26th, 1933. (418605.)

22294. "Insulator supports for electric wires or cables." L. J. Driggs. February 6th, 1933. (418534.)

22964. "Protective control systems for electric motors." W. Brooke. August 17th, 1933. (418615.)

26017. "Electrical precipitation of suspended particles from gaseous fluids." Lodge-Cottrell, Ltd. (Research Corporation of New York). September 20th, 1933. (418403.)

28372. "Mouthpieces for telephones, microphone, and the like." W. L. Colassi. April 29th, 1933. (Divided application on 15163/32.) (418620.)

29051. "Electric tumbler switches." H. Allday & Son (1922), Ltd., and R. Bain. November 24th, 1933. (418537.)

31608. "Arrangement for driving vehicles by electric transmission from an internal-combustion engine." Allmänna Svenska Elektriska Aktiebolaget. November 11th, 1932. (418409.)

32095. "Telegraphic tape-printing systems." A. D. Eitzen. November 17th, 1933. (418410.)

32627. "Magnetic cores." British Thomson-Houston Co., Ltd. November 22nd, 1932 (418539.)

34859. "Portable electric battery lamps, particularly torches." B. Rogge. May 2nd, 1933. (418470.)

34869. "Joints for electric cables." Okonite-Callender Cable Co. Inc. December 10th, 1932. (418329.)

34093. "Battery-operated pocket lamps." A. Camagni. December 13th, 1932. (418471.)

35369. "Sparking plugs for internal-combustion engines." E. T. Bunt and F. E. J. Hill. February 22nd, 1934. (418545.)

36041. "Sound-recording lamps and circuits therefor." H. A. Treviranus. February 13th, 1933 (Cognate application 36042/33.) (418330.)

36184. "Transformers combined with load elements such as X-ray devices." C. H. F. Muller Akt.-Ges. December 27th, 1932. (418473.)

36725. "Sparking plugs for internal-combustion engines." E. T. Bunt and F. E. J. Hill. December 30th, 1933. (418548.)

**1934**

3385. "Insulating materials for electrical purposes." Siemens & Halske Akt.-Ges. February 1st, 1933. (418557.)

3938. "Thermionic valves and the like." Telefunken Ges. für Drahtlose Telegraphie. February 6th, 1933. (418412.)

5234. "Telegrapn systems." Marconi's Wireless Telegraph Co., Ltd. February 25th, 1933. (418413.)

7973. "Electrical condensers." Elektrizitäts Akt.-Ges. Hydrawerk. March 18th, 1933. (418629.)

8892. "Electric insulating materials." British Thomson-Houston Co., Ltd. March 30th, 1933. (418348.)

9031. "Systems for the selective control of remote apparatus, more particularly for centralised traffic-controlling installations." General Railway Signal Co., Ltd. March 22nd, 1933. (418631.)

9889. "Insulated electrical conductor." Rockbestos Products Corporation. April 6th, 1933. (418351.)

10135. "Electric cycle lamps." Batterien und Element Fabrik System Zeiler Akt.-Ges. April 3rd, 1933. (Cognate application 10136/34.) (418491.)

10239. "Electric rectifier installations." British Thomson-Houston Co., Ltd. April 4th, 1933. (418633.)

12225. "Arc-quenching device for alternating-current switches, fuses, or the like." Siemens-Schuckertwerke Akt.-Ges. April 28th, 1933. (Cognate application 1226/34.) (418570.)

12482. "Regulating device for dynamo-electric machines." W. Dornig. May 20th, 1933. (418637.)

12766. "Electric transformers." Naamlooze Vennootschap Philips' Gloeilampenfabriken. May 13th, 1933. (418638.)

15954. "Direction-finding by wireless." G. Matheson. May 29th, 1934. (Addition to 380209.) (418640.)

16623. "Thermionic oscillation generators." Etablissements E. Belin. June 2nd, 1933. (418429.)

17892. "Electric resistances." Patent-Treuhand-Ges. für Elektrische Gluhlampen. August 2nd, 1933. (Addition to 409174.) (418642.)

18177. "Sparking plugs for internal-combustion engines." T. T. Bunt and F. E. J. Hill. February 22nd, 1934. (Divided application on 418545.) (418573.)

20724. "Arc-welding apparatus." F. B. Dehn, R. W. Carter and Hume Steel, Ltd. July 10th, 1934. (418645.)

# Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from November 14th:—

G.E.C. No. 550082. Class 6. Machinery of all kinds. No. 550083. Class 8. Telegraphic, telephonic and radio-telegraphic and telephonic instruments and apparatus and parts thereof, electricity meters and measuring instruments, electrically operated cinematograph apparatus, electric lamps for scientific purposes, electrically operated speed, distance and pressure indicators, pyrometers, rheostats, electrical signalling apparatus and accumulators and batteries (not for medical purposes). —The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

Ord & Sal (lettering and design). No. 554210. Class 8. Fitted electrical switchboards. No. 554211. Class 13. Electric fusible cut-outs, fitted electrical fuseboards, electric switches (ordinary), electric lighting fittings, and electric plug. and socket connectors.—Dorman & Smith, Ltd., Ordsal Electric Works, Middlewood Street, Salford, Manchester.

Kalgar. No. 554519. Class 8. Electric batteries (not for medical purposes).—Vidor, Ltd., West Street, Erith, Kent.

Mi-La. No. 552680. Class 13. Electric torches.—All-Bright Electric Co., Ltd., 2-5, Dingley Street, City Road, E.C.1.

Skirlyne. No. 554422. Class 18. Electric heating stoves for buildings.—John Lightfoot, Ltd., 219, Oxford Road, Manchester.

## The E.P.E.A. in Scotland

MR. J. ECCLES presided at a dinner held by the Scottish Division of the Electrical Power Engineers' Association, in Glasgow, on November 10th, to celebrate the 21st anniversary of its foundation. The toast of "The Association" was proposed by Mr. D. M'Dougall, who stated that the membership had grown to more than 5,000, and that the problems before the Association multiplied with the expansion of the industry. Mr. R. H. Toynbee (president, E.P.E.A.), responding, submitted that the staffs should now share in the prosperity of the supply industry a little more than they had done previously. The result of the work of the National Joint Board seemed to give promise of favourable results in a somewhat nearer future than had at one time seemed probable. Mr. W. J. Cooper, proposing the toast of "The Corporation of Glasgow," deplored the absence of representatives of Glasgow Corporation on the Scottish Joint Board. The Association stood four-square for conciliation, and the Board could never function properly, or truly represent Scotland, without the membership of Glasgow. Councillor Alexander Munro, replying, said that when he became convener of the Electricity Committee he appointed a special committee of the Conditions of Service Committee to deal with the matter raised by Mr. Cooper, and he had every confidence that its report would be favourable. Speaking of the electrical progress in Glasgow, he said that five years ago the number of domestic consumers was 44,000, whereas to-day it was 95,000. The price per kWh had been steadily reduced, and the Department now had for its slogan, "ten units for threepence." Industrial concerns were now finding that they could get electricity from the Corporation more cheaply than they could generate it for themselves.

# New Work for Contractors

## Particulars of new works and building schemes for the use of electrical installation contractors and traders

*Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Ashby-de-la-Zouch.**—Houses, Measham; R.D.C. surveyor.
**Ayr.**—Extension to Academy; Wm. Reid, 14, Wellington Square.
**Bath.**—Rebuilding Royal Mineral Water Hospital (£30,000); A. J. Taylor, architect, Bridge Street.
**Beeston.**—Houses (50), Burrows Avenue, Beeston Fields Estate; U.D.C. surveyor.
**Birmingham.**—Houses (500), King's Norton and Kingstanding; H. H. Humphries, surveyor, Council House. Additions to factory of Warne, Wright & Rowland, Ltd., Watery Lane, 9; J. H. Parsons, builders, High Street.
**Bournemouth.**—Houses (50) and shops, Strouden Farm Estate; borough engineer. Hotel, Westover Road; Seal & Partners. Stores, Seabourne Road; Parkstone Co-operative Society, Ltd. Additions to Heathlands Hotel, Grove Road; Lethebe & Snow. Additions to Toft House Hotel, Manor Road; Holland & Saunders.
**Bridlington.**—Houses (42), Sewerby Road; borough architect.
**Buntingford.**—Houses (38); A. P. C. Wray, builder, Hertford.
**Bury St. Edmunds.**—Senior schools (£26,813), for Borough E.C.; J. Balls & Sons, builders, Great Yarmouth.
**Caernarvonshire.**—School, Penrhyn Estate, Bangor, for C.C.
**Cardigan.**—Houses (20); borough surveyor.
**Cheam** (SURREY).—Swimming baths, Malden Road; borough surveyor.
**Cheltenham.**—Employment exchange (electrical and central heating work), St. Peter's Street South, for H.M. Office of Works, King Charles Street, London, S.W.
**Cheshire.**—Schools, Blacon, Newton, and Higher Bebington, for County E.C.; director of education, Chester.
**Chester-le-Street.**—Houses (700) (£300,000); R.D.C. surveyor.
**Chippenham.**—R.C. church, Station Hill (£3,000); Rev. Father D. Ryan.
**Chorley.**—Reconstruction of premises, Market Street, for the Lancashire Electric Power Company, National Buildings, St. Mary's Parsonage, Manchester, 3; James Cocker, Ltd., builders, Walkden, Manchester.
**Clacton-on-Sea.**—Hotel, Marine Parade, for Clacton Holiday Houses, Ltd.; Canler & Sons, builders, Jackson Road.
**Consett** (Co. DURHAM).—New bus station, Market Square, and public library; T. Hutton, surveyor.
**Darlington.**—Houses (72); E. Minors, borough engineer, Town Hall.
**Denbighshire.**—Administrative block and casual wards (£18,618), Wrexham, and school, Llay, for C.C.; clerk, Wrexham.
**Derbyshire.**—Schools, Midway, Burton-on-Trent (£9,952), for County E.C.; director of education, Derby.
**Devonshire.**—Elementary school, Oldway Estate,, Paignton; county surveyor.
**Dewsbury.**—Houses (208), Thornhill Lees, and 108 at Earlsheaton; borough architect.
**Doncaster.**—School, the Park (electrical work), for Borough E.C.; H. A. Hickson, architect, Hallcroft Chambers, Hall Gate.
**Dorset.**—Central school, Bridport, for County E.C.; director of education, Dorchester.
**Droitwich.**—Houses (300), Hill End; Biddle & Homer, builders, 20, Waterloo Street, Birmingham, 2.
**Essex.**—Schools, Hornchurch, Rainham, and improvements to Palmer's Endowed School, Grays (£9,500); County surveyor. Technical college, South-East Essex site (£135,355); Pavitt Bros., Ltd., Aveley.
**Fifeshire.**—Hospital buildings and extension to Springfield Mental Hospital; A. D. Haxton, architect, Leven.
**Fleetwood** (LANCS).—Conference hall, &c.; Wm. Melville, borough surveyor, Town Hall.
**Glasgow.**—Houses (32), Woodilee, Gartloch and Hawkhead (£12,000), and school, Hillington; city engineer. Engineering works, Balmore Road, Possilpark; G. Boswell, architect. Shops, Hillhouse Street; James Parker, Ltd.
**Golborne** (LANCS).—Houses (141), Golborne Road, for Capt. P. Curtis. Houses (43), Bodden Street and Sandy Lane, for F. T. Nicholls.
**Gorleston-on-Sea.**—Houses (26), Church Road; A. Bacon.
**Great Yarmouth.**—Houses (82), Crow Hall Farm Estate; W. West.
**Guildford.**—School, Stoughton (£29,000), for Borough E.C.; director of education. Fire station (£9,000); borough surveyor.
**Hastings.**—Underground car park (£26,000); Highways Committee.
**Hebburn-on-Tyne.**—Houses (24), near Bill Quay; Caw-Ellison Estates, Ltd., Collingwood Buildings, Newcastle-on-Tyne.
**Hersham** (WALTON-ON-THAMES).—Church, Molesey Road; D. H. Beaty-Pownall, architect.
**Hinckley.**—Police court and station (£25,561); Ottey & Clegg, Leicester.
**Houghton-le-Spring.**—Houses (30), Newtown; U.D.C. surveyor.
**Hull.**—School, Cavendish Road; City architect.
**Hyde.**—Houses (30), Garden Street (£9,930); R. B. Key. Extensions to Godley works; T. Walls & Sons, Ltd.
**Ilkeston.**—Houses (102), Corporation Road Estate; borough engineer.
**Irish Free State.**—(CORK).—Houses, Griffins Field, Gurranabraher; J. R. Boyd-Barrett, architect, 61, South Mall. (SLIGO).—Houses (112), and making of roadway and paths; McDonnell, Dixon & Downes, architects, 20, Ely Place, Dublin.
**Irvine.**—Houses (100); W. L. Weir, Town House.
**Keighley.**—Extensions to Keighley and District Victoria Hospital, for the Board of Management; P. Adams, of Adams, Holden and Pearson, architects, 9, Knightsbridge, London, S.W.1.
**Kent.**—School, Crofton, Orpington, for County E.C.; education architect, Maidstone.
**Lanarkshire.**—Houses (56) for C.C.; J. Stewart, 20, Albert Street, Motherwell.
**Leeds.**—Cinema, Moortown; J. Bodie, architect, Pudsey. New Queen's Hotel (£500,000) for London, Midland and Scottish Railway Company; Mr. Hamblyn, staff architect, Euston, London, N.W.
**Leicester.**—School extensions, Coalville (£5,150); Orton & Co., Coalville.
**Leicestershire.**—Police houses, Houghton, Wigston Fields, &c., and schools, Hinckley, and institute, Melton Mowbray; County surveyor. Extensions to county offices (£27,780); H. Herbert & Son, Leicester.
**Leven.**—Houses (43); R. J. Wigston, burgh surveyor, Carberry, Leven.
**Lincoln.**—Infants' school for St. Giles district of Lincoln, for E.C.; William Wright & Son (Lincoln), Ltd., builders, Park Street.
**London.**—(E.C.).—Rebuilding, Coroner's Court, Golden Lane (£4,795); Killby & Gayford, Ltd. (HENDON).—Balconies for Colindale Hospital (£2,355); L.C.C. architect. (KENSINGTON).—Operating and X-ray units, St. Mary Abbott's Hospital (£12,600); L.C.C. architect. (KING'S CROSS).—Premises, Pentonville Road, for Lilley & Skinner, Ltd.; Sir E. Owen Williams, architect. (SOUTHWARK).—Houses, King and Queen Street (£133,000); L.C.C. architect. (WOOLWICH).—School, Middle Park Housing Estate, for Borough E.C.; director of education.
**Luton.**—Municipal buildings; Bradshaw, Gass & Hope, architects, 19, Silverwell Street, Bolton, Lancs.
**Malling** (KENT).—Houses (22), East Malling; J. Hole, R.D.C. surveyor, High Street, West Malling.
**Manchester.**—Church of St. Christopher, Minehead Avenue, Withington, for the Diocesan Building Committee and Rev. Ronald Allen, St. Christopher's Rectory, Margaret Avenue, Withington; William Thorpe & Son, Ltd., builders, Chester Road, Cornbrook. Cinema at the junction of Moorside Road and Princess Road, Davyhulme; A. Winstanley, architect. Factory, Sharston Road, Northenden, for W. J. Brookes & Sons, Ltd., Skerton Road, Old Trafford; William Thorpe & Son, Ltd., builders, Chester Road, Cornbrook. Garage and factory, Cornwall Street and Primrose Street, Ancoats, for Batho Taylor & Ogden, Ltd., Church Street; Edwin Marshall & Sons, Ltd., builders, Cockbrook, Ashton-under-Lyne.
**Market Bosworth.**—Houses, Ibstock; R.D.C. surveyor.
**Melton Mowbray.**—Houses, Melton-Asfordby Road; R.D.C. surveyor.
**Middlesbrough.**—Shops, offices and houses, Eastbourne Road, for Thompsons Enterprises, Ltd.; G. W. Lazenby & Co., builders, Ferryhill.
**Middlesex.**—Institution laundry, Staines; County architect.
**Middleton.**—Houses (20), Millfold Road, Springfield Road, and Rochdale Road, and garages, King's Road; R. Taylor, 105, Manchester Old Road.
**Motherwell.**—Cinema, for the Associated British Cinemas (£45,000); G. U. Scott, architect, Glasgow. Offices, Glasgow Road, Wishaw (£7,000), for Wishaw Co-operative Society; secretary.
**Newcastle-on-Tyne.**—Houses (200), second five years' clearance plan, for the C.C.; R. G. Roberts, housing architect. College of Commerce and Technology (£250,000); City architect, Town Hall. Offices for the Customs, Ouseburn Quay; W. J. Steele, city engineer.
**Northallerton.**—New bus depôt for the United Automobile Services, Ltd.; Bland & Bown, architects, North Park Road, Harrogate.
**Nottinghamshire.**—Central school, Selston, for County E.C.
**Oldbury** (WORCESTERSHIRE).—Additions to factory of Accles & Pollock, Ltd.; C. Bryant & Sons, builders, Whitmore Road, Birmingham, 10.
**Ossett.**—Houses (34), Church Street; Hepworth & Moorhouse, Dale Street.
**Paisley.**—Church, Ralston, for Home Mission Committee of Presbytery; Rev. A. W. Sawer, Inchinnan.
**Rotherham.**—Houses (20), Rencliffe Avenue; E. Sutcliffe. Church, Browning Road; Vicar of Whiston.
**Royston** (YORKS).—Houses (26); J. Stothard, builder, Cudworth.
**Ryton-on-Tyne.**—Houses (52); Newcombe & Newcombe, architects, Eldon Square, Newcastle-on-Tyne.
**Seaham Harbour.**—Houses (148), under slum clearance scheme; J. B. Abbey, U.D.C. surveyor.
**Sedgley.**—Houses (56), Lower Gornal Estate; T. Alwyn Lloyd, architect. Houses (30), Temple Street; J. Horton.
**Slough.**—Bakery, &c., for the Co-operative Society; J. H. Bishton, secretary.
**Spalding.**—Houses (44); G. A. Campion, builder, Peterborough.
**Stockton-on-Tees.**—Houses (37), Hartburn Hall Estate; L. Brown & Sons, builders, Boathouse Lane.
**Stornoway.**—Houses (100); A. N. Tannahill, burgh surveyor, Municipal Buildings.
**Sunderland.**—Houses, Utterdyke Estate; J. C. Collinge, borough engineer. Factory, Durham Road, for Dunn & Co.; W. & J. R. Milburn, architects, 17, Fawcett Street. School, Ford Estate, for E.C.
**Tipton.**—Houses (56); U.D.C. housing director.
**Uxbridge.**—Estate development, Park Road; S. Milward.
**Washington.**—Houses (30); R. J. Swaddle, U.D.C. surveyor.
**West Hartlepool.**—Houses, Stanmore and Glentower Grove; W. W. Brazell, builder, Sandringham Road. Houses, for the Steam Navigation Co., Haswell Avenue, and Stockton Road; J. J. Dobson, architect, 1, Scarborough Street.
**Whickham-on-Tyne.**—Houses (96); T. Fenbow, U.D.C. surveyor.
**Wilton.**—Houses (24); Mr. Whatley, builder.
**Wrexham.**—Automatic telephone exchange for H.M. Office of Works; W. F. Humphrey, builder, Acrefair.